PATTEE'S DIETETICS

TWENTY-THIRD EDITION

Page No.	Date of ~~Issue~~ Due	Date of Return
120	27-4-54	
213	11.6.54	25.6.54
338	10/8	23.8.54
70	24-9.54	26.10.54
127	29-10.54	12/11/54
317	20/1/55.	29-1-55
428	10/3/55	9/7/55
453	17.5.56.	30/4/57
183.	- 3 SEP 1958	21-8.58
74	27 FEB 1959	4/2
209	20/11/59	25/11
172	25/5/62	30/4/62
5.	27/12	23/12/62.
109	26/1/63	16/1
—	15/12/64	10/12

etics
forming foods

y

diseases
ealues
alkalines

D te

PATTEE'S DIETETICS

Pattee's Dietetics

BY ALIDA FRANCES PATTEE

Twenty-third Edition

Revised by Hazel E. Munsell, Ph.D. and Others

Illustrated

G. P. PUTNAM'S SONS NEW YORK

practice of diet therapy to our concepts of normal nutrition is readily apparent.

Special thanks are due to the following specialists for material on various phases of diet therapy:

Allen, Frederick M., M.D., Member of Staff, Department of Medicine, Polyclinic Hospital, New York City.

Alvarez, Walter C., M.D., F.A.C.P., D.Sc., Professor of Medicine, University of Minnesota (Mayo Foundation), Rochester, Minnesota.

Amberson, J. Burns, Jr., M.D., Professor of Medicine, Columbia University College of Physicians and Surgeons, New York City.

Bannick, Edwin G., M.D., Seattle, Washington; formerly Head of Section in Medicine, Mayo Clinic, Rochester, Minnesota.

Coleman, Warren, M.D., Professor of Clinical Medicine, University of Georgia School of Medicine; Professor Emeritus of Clinical Medicine, New York University College of Medicine.

Einhorn, Max, M.D., Professor Emeritus of Medicine, New York Post Graduate Medical School and Hospital.

Erdmann, John F., M.D., Visiting Surgeon to the New York Post Graduate Medical School and Hospital.

Gauss, Harry, M.S., M.D., Assistant Professor in Medicine, University of Colorado School of Medicine, Boulder, Colorado.

Gross, Irma H., M.D., formerly resident neurologist, Mt. Sinai Hospital, New York City; now on the staff of the New York State Psychiatric Institute and Hospital.

Hetherington, H. W., M.D., M.R.C.P. (London), Chief of Clinic of the Henry Phipps Institute of the University of Pennsylvania, Philadelphia.

Jeans, Philip C., M.D., Professor of Pediatrics, University of Iowa, Iowa City, Iowa.

Johnson, Doris, M.S., Teaching Dietitian and Ward Supervisor, Presbyterian Hospital, New York City.

Joslin, Elliott P., M.A., M.D., Medical Director, George F. Baker Clinic, New England Deaconess Hospital, Boston, Mass.

Lewis, Martha Nelson, M.S., Assistant Professor of Home Economics, and Director, Dietary Department, Ohio State University Hospital.

McLester, James S., M.D., Professor of Medicine, University of Alabama, Birmingham, Ala.

Murphy, Francis D., M.D., M.S., F.A.C.P., Clinical Professor and

Director of the Department of Medicine, Marquette University, Milwaukee, Wisconsin.

Murphy, William P., M.D., Associate in Medicine, Harvard University Medical School, Cambridge, Massachusetts.

Pemberton, Ralph, M.S., M.D., F.A.C.P., Professor of Medicine, Graduate School of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania.

Pulford, D. Schuyler, M.D., F.A.C.P., F.A.S.C.P., Member of Staff, Sutter Hospital, Sacramento, California.

Rynbergen, Henderika J., M.S., Assistant Professor of Sciences, Cornell University, New York Hospital School of Nursing, New York City.

Sansum, William D., M.S., M.D., F.A.C.P., Director, The Sansum Clinic, Santa Barbara, California.

Vahlteich, Ella McCollum, Ph.D., Consulting Nutritionist.

June 24, 1945

CONTENTS

PART ONE

PRINCIPLES OF NUTRITION

INTRODUCTION—
FOOD, NUTRITION, AND DIETETICS

Since the genesis of man, food in all its aspects has been one of his chief interests, as it is of every living organism. Our knowledge of food, what it supplies to the body and how its separate constituents function in the body, has been acquired gradually over a long period of time.

It is now generally known that the health and well-being of an individual, as well as his efficiency of living, depend to a large extent upon the food he eats—that is, whether it gives him an adequate supply of those substances which enable the body to grow, to maintain and repair its parts, and to carry on its functions. Thus the function of food in the body is to furnish the materials needed to (1) build new tissue, (2) maintain and repair tissue, (3) regulate body processes, and (4) give energy.

The science of nutrition embodies our knowledge of the individual's food requirements throughout life, as governed by conditions within himself and in his surroundings. The degree to which actual intake of food has served to satisfy these requirements is judged from the nutritional status of the individual. This may be determined from measurement of certain physiologic characteristics now generally accepted as indices.

Dietetics, or the science of applied nutrition, concerns itself with the application of the principles of nutrition to the feeding of individuals or groups in health and disease. Such factors as age, physiologic condition, and economic status, as they affect dietary habits, are among the factors which must be considered in the selection of foods, planning of meals, and preparation of foods.

Food composition In order to know how to feed individuals or groups, one must know what the various foods furnish to the body. The separate parts of foods which serve different functions are known, for convenience of expression, as *food constituents,* or *nutrients.* These are usually grouped under the following six headings:

Carbohydrates	Proteins	Vitamins
Fats	Minerals	Water

They may also be classified according to the various functions food performs:

A. Nutrients which build and repair tissue
 1. Proteins 2. Lipids—fats and lipoids 3. Minerals 4. Water

B. Nutrients which regulate body processes
 1. Minerals 2. Vitamins 3. Water

C. Nutrients from which energy is derived
 1. Carbohydrates—sugar, starches, dextrin 2. Lipids—fats and lipoids 3. Proteins

Foods vary greatly in the kinds and amounts of nutrients they contain. Some foods supply large amounts of one nutrient and very small amounts of the others; or small amounts of several with no great amount of any; and so on to all conceivable combinations of kind and quality. Tables of values for the approximate composition of foods are usually given in textbooks on nutrition and dietetics.

Demonstration of food values That different foods vary greatly in food values may be demonstrated in several ways. One of the methods frequently used is the experimental feeding of small animals. The white rat has been found convenient for this purpose since it is small, easily handled, and will readily eat any food eaten by man. The illustrations on page 5, obtained from such a feeding trial, may be used as convincing evidence of the need for a diet that supplies adequate amounts of all of the nutrients.[1]

The adequate diet From the above discussion it will be apparent that for growth and development, as well as for health and well-being throughout life, an individual must eat such foods as will give him an adequate supply of all of the essential nutrients. A combination of foods to meet these requirements is most often described as an *adequate diet*. In terms of nutrients the adequate diet must contain:

1. Carbohydrates and fats sufficient to yield the energy (a) for the internal activities of the body essential to life and (b) for the external work done. Protein may serve as a source of energy but should not be reckoned as a primary source.

2. Protein sufficient for growth and maintenance of all body cells.

3. Minerals in adequate amounts (a) for the growth and maintenance of teeth and bony structures and (b) for the regulation of body processes.

[1] These illustrations are taken from charts prepared in the Bureau of Home Economics, U. S. Department of Agriculture, Washington, D. C.

A. This rat ate only meat, potato, bread, and butter. He weighed only 89 grams. Notice that his body is stunted, and his fur rough.

This is the skeleton from the rat shown above. Even his bones show the effect of his poor diet.

B. This is a twin brother of Rat A. He also ate meat, potato, bread, and butter. But he had in addition milk and a small piece of carrot and spinach each day. He weighed 194 grams. His body is well formed, his fur sleek and clean.

This is the skeleton of Rat B. His bones are strong and well formed, showing that his diet contained all of the nutrients needed for good growth.

4. Vitamins of the right kind and in the right amount for regulation of body processes.
5. Water.

Diets are usually planned in terms of foods rather than of food constituents, and then, if necessary, checked for their content of specific nutrients. The primary aim in the discussion that follows is to give information basic to the selection of foods for an adequate diet and show how such selections may be modified to meet the needs of the body under special conditions.

I.

FOOD CONSTITUENTS—THEIR FUNCTIONS AND OCCURRENCE

CARBOHYDRATES—Furnish Energy (Calories)

Carbohydrates are widely distributed in foods; they form the major proportion of foods of plant origin and are the important source of energy.

Definition A carbohydrate is a single sugar or a substance that can be converted into a single sugar by hydrolysis.[1] This may be accomplished by digestive enzymes or by heating in solution with dilute acids.

Composition Carbohydrates are composed of the three elements: carbon, hydrogen, and oxygen; and they are characterized by having hydrogen and oxygen present in the same proportions as in water—hence the name "carbohydrate."

Function The major function of carbohydrates in the diet is to supply energy. When digested, all carbohydrates which serve as food are broken down into single sugars. These are then changed, through a series of complicated chemical reactions, into carbon dioxide and water, yielding energy for work, with heat energy as a by-product. An adequate supply of carbohydrate in the diet makes it unnecessary for the body to use protein as a source of energy. This is known as the "protein-sharing" quality of carbohydrate.

A sufficient supply of carbohydrate in the diet is essential for the proper utilization of fat. When fat is used as a source of energy without sufficient carbohydrate, acidosis may be induced, as in diabetes without insulin treatment.

Fuel value Each gram of carbohydrate utilized in the body as a source of energy yields 4 calories.[2]

[1] Hydrolysis means splitting through the addition of the elements of water.

[2] The calorie is the unit of heat energy. As used here, it is equivalent to the heat required to raise the temperature of 1 kilogram of water 1° centigrade.

Storage in the body Carbohydrate taken in excess of the body needs for energy material is stored as (1) glycogen in the liver and as (2) fat. Sugar eaten in too-great amount or in too-concentrated form blunts the appetite for more essential foods. It is also likely to ferment in the digestive tract, thus irritating the membranes as well as causing discomfort.

Food sources Carbohydrates come almost entirely from foods of vegetable origin. They are the chief constituents of roots, tubers, seeds or cereals, and some fruits.

A. Sugars and foods chiefly sugar

1. Cane, beet, in all their forms, and their products 2. Candies, frosting, desserts 3. Preserves and jams 4. Syrups, maple and corn 6. Honey 7. Sweet fruits

B. Foods high in starch

1. Cereals—oatmeal, wheat, rice, corn, barley, rye 2. Tapioca 3. Cornstarch 4. Sago 5. Flours of all kinds 6. Macaroni and spaghetti 7. Bread and crackers 8. Potatoes

C. Foods which yield considerable cellulose

1. Whole-grain cereals 2. Bran 3. Fruits 4. Vegetables, especially fibrous ones

Classification Carbohydrates are classified chemically according to the number of saccharides, or sugar groups, contained in each molecule, as follows:

A. Monosaccharides, or single sugars (one-sugar group)

1. Glucose or dextrose (grape sugar) 2. Levulose or fructose (fruit sugar) 3. Galactose (from milk sugar)

B. Disaccharides (double sugars)

1. Sucrose (cane, beet, or maple sugar) 2. Lactose (milk sugar) 3. Maltose (malt sugar)

C. Polysaccharides (complex compounds yielding several sugars)

1. Starch 2. Dextrin 3. Glycogen 4. Cellulose and hemicellulose [3]

[3] Not digested in the body, hence do not yield sugar.

MONOSACCHARIDES, OR SINGLE SUGARS

($C_6H_{12}O_2$)

The three single sugars—glucose, fructose, and galactose—are all crystalline materials soluble in water and readily absorbed in the body. They represent the end-products of sugar digestion before absorption takes place. All other forms of carbohydrates must be broken down into single sugars through digestion before they can be absorbed and utilized in the body.

GLUCOSE OR DEXTROSE

Physiologically glucose is the most important of the single sugars because it is the form of sugar found in the blood. Taken in large quantities, glucose may ferment or flood the system too rapidly with sugar; but it is a very economical source of energy as naturally present in fruits and other foods, or as added in the pure form in small quantities to other foods. Glucose is not as sweet as cane sugar; hence a larger quantity must be used for sweetening.

Glucose constitutes about 0.1 per cent of the blood of all animals. It is found throughout the vegetable kingdom chiefly in the juices of fruits and plants, being especially abundant in grapes. It often constitutes 20 per cent or more of the weight of the fresh grape, and considerably more than half of the solid matter. Glucose is made commercially from starch by hydrolysis with acids.

LEVULOSE OR FRUCTOSE

Levulose is the form of sugar found largely in fruits. When sucrose is broken down by digestion or by hydrolysis with dilute acid, glucose and fructose are formed in equal quantities. Such a mixture of glucose and fructose is known as *invert sugar*. Honey contains glucose and fructose in almost equal proportions.

GALACTOSE

Galactose does not occur naturally in foods, but is formed during the digestion of lactose, or milk sugar. It may also be obtained from lactose by hydrolysis with dilute acids.

DISACCHARIDES, OR DOUBLE SUGARS

$$(C_{12}H_{22}O_{11} + H_2O \rightarrow C_6H_{12}O_6 + C_6H_{12}O_6)$$

The disaccharides—sucrose, lactose, and maltose—on digestion or on heating with dilute acid give 2 molecules of single sugar. This relation is shown diagrammatically in the chemical formula given above. These sugars, like the single sugars, are crystalline in form and soluble in water.

SUCROSE

Ordinary table sugar is pure sucrose. This sugar constitutes part of the usual diet of most persons. Sucrose is a valuable source of energy but must be used with discretion since in too-large amounts or in too-concentrated form it irritates the membrane of the stomach and is liable to ferment. Also because it is quickly absorbed, it either satisfies the appetite before the need for food has been entirely met or blunts it so that other foods necessary to insure the adequacy of the diet become distasteful and are not eaten.

Dried fruits are better sweets than pure sugar, especially for children, since fruits contain important mineral salts which are wholly lacking in sugar.

Sugar should be avoided in gastric disorders and in diabetes; and, since it gives only calories, it should be used sparingly in cases of obesity.

By boiling for a long time or in the presence of acids (whether naturally in the fruit or added to it) sucrose may be changed to a form of invert sugar, which has a peculiar penetrating sweetness not as pleasing as the flavor of cane sugar.

Food sources Sucrose occurs in the sap or juices of a variety of plants—sugar cane, sugar beets, and maple syrup being the most important commercial sources. In the preparation of sugar the sap is obtained from the plant material by crushing. This sap is then concentrated by boiling off the water until the sugar crystallizes out. The crystals are then removed by centrifugation. Refining is carried out by recrystallizing from water until the desired purity is obtained. Cane and beet sugar are usually refined and therefore do not have any characteristic flavor, but maple sugar retains a characteristic flavor since it is prepared by concentration without refining.

LACTOSE

Lactose, or milk sugar, occurs in the milk of all mammals. It is less sweet and much less soluble in water than sucrose and does not readily ferment. Because of its mild flavor and because it is less irritating to the digestive tract than sucrose, it is widely used in the feeding of infants and invalids, where it is a valuable source of energy.

MALTOSE

Maltose, or malt sugar, is found in germinating seeds, whether sprouted naturally or in the malting process. It is produced by the action of dilute acids or digestive enzymes on starch.

TESTS FOR SUGARS

A simple test for sugars in general consists of adding an equal volume of concentrated sodium hydroxide solution to the suspected solution and boiling. A brown color indicates the presence of sugar.

The chief test for glucose is Fehling's.[4] This test is based on the fact that glucose reduces salts of copper by depriving them of some of their oxygen, and an insoluble oxide of copper is precipitated which is recognized by its reddish color.

Fehling's Solution may be obtained at any apothecary's. To make a test, place some of the Fehling's Solution in a test tube and add a few drops of the solution to be tested and heat to boiling. If a red precipitate forms, glucose is present. The sole use of this test for the nurse will probably be in connection with diabetes, when the nurse makes the test at the request of the physician.

SUBSTITUTE FOR SUGAR

Since sugar is used not only as a fuel food but also as a condiment, attempts have been made to secure a substitute for use in cases where carbohydrate is limited or denied. The best-known substitute is saccharin, a crystalline coal-tar product. This is many times sweeter than sugar but has no food value.

[4] For Benedict's test for sugar, see page 261.

POLYSACCHARIDES, OR COMPLEX CARBOHYDRATES

$(C_6H_{10}O_5)_x$

The polysaccharides include starches, dextrins, glycogen, cellulose, and hemicellulose. These substances differ from the sugars in that they are not crystalline and do not dissolve readily in water. Some when heated may form a gelatinous colloidal dispersion in water.

Starches, dextrins, and glycogen are broken down into single sugars in the body during digestion and are thus utilized as a source of energy. Cellulose and hemicellulose, on the other hand, are not broken down by digestive enzymes. Their value in the diet is to give bulk, which is essential for good digestion of foods.

STARCH

Starch is the form in which plants store carbohydrate. In its pure state, starch is a white powder consisting of tiny granules and having a distinctive quality to the touch. As seen under the microscope, different starches have characteristic shapes and markings which are an aid in their identification.

Starch is not soluble in cold water, but is rendered soluble by dry heating at high temperature or by the action of certain digestive ferments. In warm water, starch granules absorb water and swell, with consequent rupturing of the granule. On boiling, a gelatinous colloidal dispersion is formed. In this form starch is much more easily hydrolyzed or acted upon by digestive ferments.

In the conversion of starch to sugar, the first change results in the formation of dextrin, whether the process is brought about by the action of saliva or by dry heat as in the preparation of toast.

Food sources Starch occurs widely distributed in the vegetable kingdom and is one of the principal constituents of foods of plant origin. It is found in largest amount in seeds, roots, tubers, and bulbs, and to some extent in stems and leaves. In cereal grains one-half to three-fourths of the bulk is starch, and it comprises at least three-fourths of the bulk of potatoes. Commercially, starch is obtained from wheat, corn, rice, potatoes, and arrowroot.

Principles of cooking The principles involved in the cooking of starch are of two types—chemical and mechanical.

Chemical Principles: In the presence of moisture at the temperature

of boiling water, starch becomes semisoluble. Gruels are made by cooking cereal flours in water at or near the boiling temperature till the raw taste is gone.

Starch can be converted into dextrin by dry heat at a temperature of 300° to 400° F. A little dextrin forms on the outside of a slice of bread in making toast. A small portion of the starch is further changed to caramel, giving a characteristic flavor to the crust of bread.

Mechanical Principles: When foods which consist largely of starch, such as flour, cornstarch, etc., are to be cooked with a liquid, care must be taken to prevent the formation of lumps. These are not only unsightly, but consist of an outer layer of cooked starch surrounding a center of raw starch, which condition retards digestion. There are three methods of avoiding lumps:

1. By mixing the starch gradually with a small portion of cold water, so that a smooth paste is formed before adding the boiling liquid. This method is used in making gruels.
2. By mixing with melted fat before adding liquid. The fat separates the starch granules. At least as much fat as starch must be used. The liquid is preferably added cold and all at once. If added hot, it must be stirred in very gradually. This method is employed in making gravies, sauces, etc.
3. By mixing with sugar. The dissolved sugar serves to separate the starch grains. This is practicable only when the sugar is greater in amount than the starch, and the liquid must be added gradually. This method is applied in the case of desserts, such as cornstarch pudding.

In cooking foods which consist of a mixture of starch and cellulose, such as breakfast cereals, it is necessary to soften and break up the cellulose layer surrounding the starch, so as to enable the digestive juices to reach the starch.

Modern cereals are usually crushed, cracked, or ground, and heated at the factory to help in the softening of the cellulose. Even then, it is desirable to cook cereals till thoroughly softened and swollen, in order to improve their texture and flavor, as well as to insure easy digestion.

Reheating of breads tends to promote their ease of digestion. For this reason Zwieback (twice-baked bread) is more readily digested than fresh bread, and also because, being hard and dry, it requires more thorough mastication than does fresh bread, which is likely to be swallowed in soft, doughy lumps.

Test for starch Since starch is colored blue by iodine, it is easy to detect its presence in any food. To make a test, place a small portion of the material in a test tube, boil with a little water, cool, and add two or three drops of dilute tincture of iodine. If starch is present, a blue color will appear immediately. Dextrin gives a port-wine color with iodine, so if any of this substance is present the color is modified, becoming purplish or purple-red.

DEXTRIN

Dextrin is the first substance formed in the course of the digestion of starch. It is produced from starch by the action of digestive enzymes, acid, or by dry heat. It may be split into the disaccharide maltose, which in turn will yield 2 molecules of glucose.

GLYCOGEN

Glycogen has much the same relation to the animal body as starch has to plants. It is the form in which the body stores carbohydrate and is sometimes called *animal starch*. Glycogen is found in nearly all parts of both the animal and the human body, but chiefly in the liver.

When completely burned, glycogen yields glucose alone as an end-product. Hence, when either the supply of glucose drops low or the demand for it suddenly increases, the body draws on the glycogen in the liver to supply the necessary glucose.

CELLULOSE AND HEMICELLULOSE

Cellulose and hemicellulose form the framework of plants. They are not digested in the body, hence have no nutritive value. Because they are not digested, they form the major part of the ballast or roughage so necessary to normal intestinal movement. They stimulate peristalsis by acting as a gentle mechanical irritant, by helping to retain moisture and thus keeping the feces soft, and by giving them such bulk that the intestinal muscles can act to advantage.

Unless it is desirable for some special reason to relieve the digestive tract of all work, a certain amount of cellulose should be included in the diet. In constipation the addition of an increased amount of cellulose in some nonirritating form like agar-agar has proved a successful therapeutic measure.

Much of the cellulose naturally present in foods is removed in pre-

paring it for the table. For this reason suitably prepared bran is frequently added to food by those having a tendency to sluggish intestinal movement. The same results can be secured by including in the diet a greater proportion of foods which contain large amounts of roughage or ballast, such as green vegetables, fruits, and whole-grain products.

QUESTIONS FOR STUDY

1. What is a carbohydrate?
2. Of what chemical elements are carbohydrates composed?
3. What is the fuel value of 1 gram of carbohydrate?
4. How are carbohydrates classified?
5. Are animal or vegetable foods the better source of carbohydrates?
6. What are monosaccharides? Disaccharides? Polysaccharides?
7. What are the functions of carbohydrate in the body?
8. Can it be stored in the body?
9. How are carbohydrates classified? Give an example of each.
10. Why is glucose so important?
11. Discuss the cooking of starch.
12. What is the relation of glycogen to starch?
13. Of what value is cellulose?

LIPIDS (FATS AND LIPOIDS)—Furnish Energy (Calories)

The term "lipids" includes both true fats and fatlike substances known as lipoids.

FATS

Like carbohydrates, fats are widely distributed in foods of both plant and animal origin. They form a concentrated source of energy.

Definition Fats are glycerides, or combinations of fatty acids and glycerol in the proportion of 3 molecules of fatty acid to 1 of glycerol. Since there are many fatty acids, the combination of them with glycerol gives many different fats, especially since some contain more than one kind of fatty acid.

Composition Fats, like carbohydrates, contain carbon, hydrogen, and oxygen; but the proportion of oxygen to both carbon and hydrogen is less than it is in carbohydrates.

Fats may be either liquid or solid at ordinary temperature, depending

upon the kind of fatty acid they contain. The type of fatty acid in fat also determines its characteristic odor and flavor.

The fats most generally found in foods are stearin, palmitin, olein, and butyrin. *Stearin* is a hard fat with a high melting point. It is the characteristic fat of beef suet, and is present in some proportion in most fats. *Palmitin,* found in both animal and vegetable fats, is softer than stearin. *Olein,* the characteristic fat of olive oil and other salad oils, is liquid at ordinary temperatures. *Butyrin,* responsible for the characteristic flavor of butter, is semiliquid.

Function The chief function of fat is to supply a source of energy. Many fats also serve as carriers—that is, food sources of the fat-soluble vitamins, vitamin A, vitamin D, vitamin E, and in some cases vitamin K. In addition, fat serves in the body as a packing and support for the vital organs, particularly the kidneys. Since it is a nonconductor of heat, a layer beneath the skin helps to conserve body heat.

Fat has a tendency to retard the motility of the stomach and the secretion of the gastric juice, thus delaying the rate of digestion in the stomach. This property is sometimes, although not always, an advantage. The layer of fat on fried foods may unduly delay the digestion of the inner part. The softer fats and emulsified fats, such as cream and egg yolk, are digested more rapidly than those that are harder.

When fats are heated to a very high temperature in cooking, the glycerol may be decomposed, giving rise to substances irritating to the mucous membrane.

Fuel value Each gram of fat utilized in the body as a source of energy yields 9 calories—2½ times as many as the same weight of carbohydrate or of protein. This explains why fats are described as concentrated sources of energy. Under ordinary conditions from 30 to 40 per cent of the daily energy—calories—expended by the average adult comes from fat.

Storage in the body Fat is stored in the body in the tissues and in various fat depots. Excess fat taken in in the food is first stored in the fat depots, and then in the muscle tissues. Excess fat in the muscles may impair the normal functioning of such organs as the heart, kidneys, and liver. On the other hand, too little fat in the diet may lead to underweight and insufficient fat in the tissues to give them normal support.

Food sources Fats may be obtained in about equal proportion from foods of plant and of animal origin. Important sources of fat are:

A. Foods of animal origin

1. Cream, butter, whole milk, whole-cream cheese 2. Fat meats, such as bacon, salt pork, beef suet, and poultry fat 3. Lard and drippings 4. Fatty fish, such as salmon, sardines, and mackerel, especially when packed in oil 5. Egg yolk

B. Foods of plant origin

1. Olive oil and other vegetable oils, such as cottonseed, peanut, and corn oils 2. Oleomargine and other butter substitutes 3. Nuts, olives, avocados, and coconuts 4. Chocolate

C. Prepared dishes

1. Ice cream 2. Beverages made with egg yolk or cream in both 3. Cream sauces 4. Pastries

LIPOIDS

Besides the true fats—esters of fatty acids and glycerol—there are many fatlike substances related to them both chemically and physiologically which occur widely in nature and are essential constituents of every living cell. These are classified as lipoids, the two most important groups of which are the phospholipids, or phosphatides, and the sterols.

PHOSPHOLIPIDS

Phospholipids are combinations of glycerides with phosphoric acid and nitrogen. *Lecithin* is a necessary constituent of every living cell, and from the standpoint of nutrition is the most important of the phospholipids. It is found in brain and nerve tissue, in blood and lymph, and in other animal and plant tissues. In foods it is present in egg yolk, milk, and many seeds.

STEROLS

The sterols are complex compounds of high-molecular-weight alcohols with fatty acids and are soluble in fat solvents. One of the most important sterols is *cholesterol,* which is present in nearly every living cell and in the blood. Considerable quantities are found in the brain and in the skin. In pernicious anemia the amount of cholesterol in the blood is abnormally low; in diabetes and nephrosis it is high. Gallstones are sometimes composed entirely of cholesterol.

VOLATILE OILS

The volatile oils are an important group of fatlike substances, though they have little in common with true fats or other lipids a no nutritional value except as they enhance the flavor of food. Th vary greatly in composition and are characterized by their individu odors, tastes, and pungency. Since they are volatile, those used as flav ing in cooking should be added at the last moment. Examples of th volatile oils are oil of bergamot, obtained from a variety of orange, a oil of lemon, from lemon peel.

QUESTIONS FOR STUDY

1. What are fats?
2. Of what chemical elements are they composed?
3. How do fats differ chemically from carbohydrates?
4. What is the fuel value of 1 gram of fat?
5. What percentage of total daily calories usually come from fats?
6. Name and describe four common fats found in food.
7. Name five animal and five vegetable foods which are rich in fat.
8. What are the functions of fat in the body?
9. Is fat stored in the body?
10. Discuss the digestibility of fat. Does the cooking of fat affect i digestibility?
11. What are lipoids?
12. What are phospholipids? Name the most important one.
13. What are sterols? Name the most important one.
14. What is the function of volatile oils?

PROTEINS—Build and Maintain Body Tissues

Proteins are essential constituents of every living cell in both plan and animals. Without proteins life is not possible.

Definition The fundamental characteristic of proteins is that the contain nitrogen in specific chemical units called amino acids, whic are best described as the building blocks of protein. Amino acids a the end-products of the breakdown of protein molecules by digestio before absorption. They bear much the same relation to protein as gl cose does to starch, except that all molecules of glucose are alik whereas one protein molecule may contain several different amin acids, the number usually varying from 12 to 20.

Composition In addition to the nitrogen which characterizes them as a group, proteins contain carbon, hydrogen, and oxygen, as do fats and carbohydrates. They also contain sulphur, and many of them contain phosphorus or iron. Proteins are highly complex chemical compounds, as may readily be surmized from the number of amino acids they may contain. Present indications are that many, if not all, of them also contain a sugar radicle, or hexose. Since there are apparently several of these that may enter into combination, this factor adds still further to the complexity of protein structure.

Nitrogen may be present in other constituents of food besides the protein fraction. Some of these, known as extractives, are found in muscle juice, and consist chiefly of *creatin, creatinin,* and *purins* (uric acid and related substances). The extractives have no significant food value and are useful only as stimulants. They give to meats their characteristic flavor, hence stimulate appetite and the flow of gastric juice. For this reason extracts of meat, such as beef tea, beef juice, and soups made from meat stock, are valuable in feeding the sick.

Nitrogen is also present in the molecular structure of several of the vitamins—thiamine (vitamin B_1), riboflavin, nicotinic acid (niacin), pyridoxine, biotin, and choline.

Classification Proteins are classified as (1) complete, (2) partially incomplete, and (3) incomplete, according to their amino-acid content. The amino-acid content of a protein determines its nutritive value. Several amino acids have specific functions in the body, since some are essential for growth and others for maintenance of function. The animal body cannot manufacture several of these essential amino acids; consequently they must be supplied in food. Hence the basis for the classification given.

Complete proteins are those which contain all the amino acids necessary for both maintenance and growth, and which when used as the sole protein food can both maintain life and promote normal growth. *Casein* and *lactalbumin* in milk, *ovalbumin* and *ovovitellin* in eggs, and *edestin* in grains are examples of complete proteins.

Partially incomplete proteins alone can maintain life but cannot promote growth. *Gliadin* in wheat is one of these. Among the amino acids, *lysine* has been found to be essential for growth and *tryptophane* necessary for maintaining life. Gliadin contains tryptophane but is deficient in lysine. Hence it will maintain weight in the adult, but will not promote growth in the young.

Incomplete proteins can neither maintain life nor promote growth. *Zein* in corn, and *gelatin* are both incomplete proteins. Gelatin is the only food which contains none but incomplete protein. This does not mean that the protein in these foods is not good. It means simply that it must be supplemented in the diet by other more adequate protein.

CHARACTER OF PROTEINS IN SOME COMMON FOODS [5]

FOOD MATERIALS	CHIEF KINDS OF PROTEIN PRESENT	COMPLETE OR INCOMPLETE
Almonds	Excelsin	Complete
Cheese	Casein Lactalbumin	Complete Complete
Corn	Glutelin Zein	Complete Incomplete (lacks lysine and tryptophane)
Eggs	Ovalbumin Ovovitellin	Complete Complete
Gelatin	Gelatin	Incomplete (lacks tryptophane and tryosine; high in lysine)
Lean meat	Albumin Myosin	Complete Complete
Milk	Casein Lactalbumin	Complete Complete
Navy beans	Phaseolin	Incomplete
Peas	Legumin	Incomplete
Soy beans	Glycinin Legumelin	Complete Incomplete
Wheat	Gliadin Glutelin	Partially incomplete (low in lysine) Complete

Functions Protein has several functions in the body:

1. As the primary constituent of all cells, it is needed for the building of new tissues. It is especially important that the child have ade-

[5] From G. MacLeod and C. M. Taylor, *Rose's Foundations of Nutrition*, 4th ed., New York: The Macmillan Company, 1944. By permission of the publishers.

quate protein for the building of muscle tissue and other body structures.

2. There is a continuous wear and tear on body tissues concomitant with life. New material must be built to take the place of the worn-out cells in tissues. Thus a continuous supply of protein is required for the maintenance and repair of body tissue at all ages.

3. Under conditions when the supply or utilization of carbohydrate and fat for energy is not adequate, energy may be derived from protein. Protein is not, however, an economical source of energy compared to fat and carbohydrate. All foods stimulate metabolic processes with a consequent increase in energy expenditure. This property is called the specific dynamic action of food, and it is directly related to the kind of substance involved. The specific dynamic action for protein is several times that for carbohydrate or fat, thus again making protein an expensive food as far as energy expenditure is concerned.

Fuel value Each gram of protein utilized in the body as a source of energy yields 4 calories. Under ordinary conditions protein to meet body requirements supplies 10 to 15 per cent of the total calories for the day.

Storage in the body Protein, unlike carbohydrate and fat, cannot be stored in the body greatly in excess of immediate body needs. Any surplus over the day's requirement is broken down, the nitrogenous fraction being excreted through the kidneys, while the nonnitrogenous fraction is utilized as a source of energy.

Demonstration of the value of protein in the diet[6] These three rats are brothers, eleven weeks old. Illustration A shows that the quantity of protein in the diet is important. Illustration B shows that the kind of protein is important.

A. This rat had good protein but not enough. It weighed 70 grams.

[6] These illustrations are taken from charts prepared in the Bureau of Home Economics, U. S. Department of Agriculture, Washington, D. C.

B. This rat had enough protein, but of a poor kind. It weighed only 65 grams.

C. This rat had good protein and plenty of it. It grew normally and weighed 193 grams.

Food sources Proteins are supplied in the diet by foods of plant and of animal origin. Generally speaking, proteins of animal origin have the higher food value in that they contain the essential amino acids in greater amount and also in more satisfactory proportions from the standpoint of body needs.

Among the foods of plant origin, legumes are the outstanding sources. (Soybeans are particularly noted for their excellent protein value.) Some nuts also contain considerable amounts, and many of the cereal grains are important sources of protein and several of high quality protein. Good protein foods are:

A. Foods containing 10%-30% protein
 1. Lean meat, all kinds 2. Lean poultry, all kinds 3. Fish 4. Shellfish 5. Eggs 6. Cheese

B. Foods containing 3%-10% protein
 1. Breads 2. Cereals 3. Legumes 4. Milk

C. Foods containing 0.5%-3% protein
 Most fruits and vegetables

Stated in terms of average servings, the principal protein foods supply approximately the following amounts:

FOOD AVERAGE SERVING	WEIGHT IN GRAMS	PROTEIN PER CENT	GRAMS OF PROTEIN SUPPLIED
Meat, 2 or 3 slices	50–100	20–25	10–25
Poultry, 1 or 2 slices	50–100	20–25	10–25
Fish, 1 piece	30	20	6
Shellfish, 1/3 cup	85	6–25	5–20
Eggs, 1 egg, whole	50	13	6.5
Milk, 1 glass	220	3.5	7.7
Cheese, 1 in. cube	20	20–30	4–6

The protein of milk contains all the amino acids essential to growth and is very completely digested and absorbed. A quart of milk furnishes more than an ounce of pure protein.

Cooking of protein Animal protein should be cooked at a moderate temperature. Otherwise it will become tough and less easily digested.

Effect of heat on protein The following experiment with egg albumin, one of the most familiar proteins, illustrates some of the properties of proteins in general.

Put some white of egg into a test tube, place in a saucepan of cold water, heat gradually, and make the following observations:

1. Raw egg white is a sticky, clear, pale straw-colored liquid. It is readily digested.
2. When the water reaches the temperature of 134° F., white streaks will be seen in a semisolid substance. It is still readily digested.
3. When the water reaches the temperature of 150° to 160° F., the egg white will be soft and jellylike in consistency and is still readily digested.
4. When the water reaches 212° F., the egg white will be a tough white jelly which is less readily digested.
5. When egg white is heated to 300° F. or higher, for example by putting the test tube directly over the flame, it will almost immediately become hard and tough and difficult of digestion.

Thus it is seen that animal proteins are hardened and toughened by high temperature and are most tender and readily digested when cooked at a low temperature.

QUESTIONS FOR STUDY

1. What are proteins?
2. What are amino acids?
3. Of what chemical elements are proteins composed?
4. How do proteins differ chemically from carbohydrates and fats?
5. Which is the distinguishing element in protein? Why?
6. What are nitrogenous extractives?
7. What is the fuel value of 1 gram of protein?
8. What percentage of total daily calories should come from protein in order to meet the protein requirement?
9. What is a complete protein? Name several.
10. What is an incomplete protein? Name two.
11. What are some common foods rich in protein? How do animal and vegetable foods compare in protein content?
12. Why is the protein of milk so valuable?
13. What effect has heat upon animal protein?
14. Is protein stored in the body for future use?
15. What is the chief function of protein? Why is it an expensive source of energy?

MINERALS—Regulate Body Processes, Aid in Building and Maintaining Important Body Substances

Minerals, known variously as mineral elements, inorganic foodstuffs, or ash constituents, make up only a small percentage of body weight. They are nonetheless vital to well-being, and a thorough understanding of the part they play in nutrition is as essential as in the case of other nutrients.

Definition Mineral elements are inorganic nutrients found in the body either as simple salts or in combination with complex organic substances. They occur in the ash which remains when the combustible portion of the food has been burned.

Elementary composition of the body[7] From various estimates, the average elementary composition of the body may be presumed to be approximately as follows:

[7] Adapted from H. C. Sherman, *Chemistry of Food and Nutrition,* 6th ed., New York: The Macmillan Company, 1941. By permission of the publishers.

ELEMENT	APPR. % IN BODY	ELEMENT	APPR. % IN BODY
Oxygen	65	Chlorine	0.15
Carbon	18	Magnesium	0.05
Hydrogen	10	Iron	0.004
Nitrogen	3	Manganese	0.0003
Calcium	1.5	Copper	0.00015
Phosphorus	1.0	Cobalt	*
Potassium	0.35	Zinc	*
Sulphur	0.25		
Sodium	0.15		

* Believed to be essential, but as yet there is no agreement as to how much is present.

Several other elements are present in the body, but their functions are still unknown.

Those elements for which percentages are given are recognized as essential in the diet; and cobalt and zinc as probably essential.

Calcium, phosphorus, and iron are so necessary to the proper functioning of the body, and yet so often insufficiently supplied by the diet, that special care should be taken to see that proper amounts are furnished. When this is done, the chances are good that the other minerals will also be supplied in adequate amounts. Iodine is one, however, that may require special attention.

Functions of minerals in general Mineral elements may exist in the body and take part in its functions in at least three kinds of ways:[8]

1. As constituents of the bones and teeth, giving rigidity and relative permanence to the skeletal tissues.

2. As essential elements of the organic compounds which are the chief solid constituents of the soft tissues (muscles, blood cells, etc.).

3. As soluble salts held in solution in the fluids of the body, giving these fluids their characteristic influence upon the elasticity and irritability of muscle and nerve, supplying the material for the acidity or alkalinity of the digestive juices and other secretions, and yet maintaining the neutrality of the body's fluids as well as their osmotic pressure and solvent power.

Minerals maintain the tone of muscle and nerve, influence the quality of the digestive juices, and make it possible for the body fluids to pass in and out of the tissues and so carry nourishment to the body cells.

With normal diet and activity, a healthy man usually loses from 20 to 30 grams of mineral salts daily by excretion. There is also a minute

[8] *Ibid.*

amount which is lost through daily wear of the body. Food acts to replace these losses.

Storage in the body Minerals in excess of the daily need are not stored in the body in the sense that fats and carbohydrates are stored.

Food sources Foods to supply mineral elements should be chosen with reference to (1) how much of the mineral they contain, (2) whether they supply the mineral in a form readily used by the body, (3) whether the mineral is retained during any process of refinement the food may have undergone, and (4) the quantity of the food to be used. As a rule the following selection of foods will furnish adequate minerals for persons in good health.

FOOD	ADULT	CHILD
Milk	1 pt. to 1 qt.	1 qt.
Meat	Average serving	Small serving
Eggs	1 or 2	1
Potato	1 medium	1 medium
Vegetables	Average serving of three	Moderate serving of three
Fruit	½ glass orange juice *and* 1 apple, pear, or other fruit	1 glass orange juice *and* 1 apple, pear, or other fruit
Cereal	1 serving, whole grain	1 serving, whole grain
Bread	3 slices, whole wheat	3 slices, whole wheat
Butter	1 oz.	1 oz.
Simple dessert	1 serving	1 serving

CALCIUM—For Strong Bones and Teeth

Calcium is the mineral of which the largest amount is needed and at the same time the one most likely to be deficient in the ordinary mixed diet of Americans and Europeans. The body contains more calcium than any other mineral. Over 99 per cent of this is in the bones and teeth, the remainder forming an essential constituent of the soft tissues and body fluids. Combined with phosphorus, as calcium phosphate, calcium constitutes about 75 per cent of the total body ash.

Functions The principal functions of calcium in the body are:

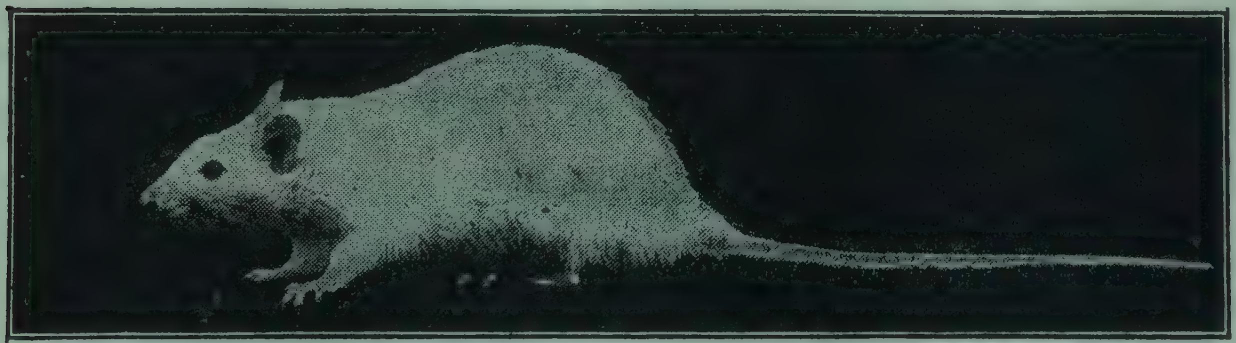
1. To build strong bones and teeth.
2. To prevent disturbances of inorganic equilibrium in the body.
3. To aid in clotting of the blood.
4. To insure the normal responses of heart and other muscles and nerves.
5. To aid in the absorption of the end-products of digestion.

Effect of deficiency Deficient calcium intake results in:

1. Poor teeth and jaws.
2. Poor bones, with possibly resultant rickets.
3. Damage to mother's teeth and bones during pregnancy and lactation.
4. Slow clotting of the blood.
5. Poor regulation of muscle and nerve responses.

Demonstration of the need for calcium in the diet [9] These are twin rats, 11 weeks old.

A. This rat did not have enough calcium. It weighed 91 grams. Note the short, stubby body, due to poorly formed bones.



B. This rat had an abundance of calcium, and weighed 219 grams. Its bones are well formed.

Food sources Milk is the most important natural food source of calcium for individuals of all ages. This applies also to all milk products except those containing only the fat fraction. The calcium of milk, in addition to being present in relatively large amounts, is also well utilized.

Many vegetables contain fair amounts of calcium, but there is con-

[9] These illustrations are taken from charts prepared in the Bureau of Home Economics, U. S. Department of Agriculture, Washington, D. C.

siderable variation among them as to the availability of this calcium to the body. Several of them, notably spinach, beet greens, and sorrel, contain oxalic acid in significant amounts, which presents the calcium in the form of its insoluble oxalate which cannot be utilized.

The calcium of other vegetables [10] such as broccoli, carrots, cabbage, cauliflower, celery, Chinese cabbage, collards, kale, leeks, lettuce, rutabaga leaves, string beans, tender greens and turnip greens seems to be well utilized.

Other foods containing relatively large amounts of calcium are almonds, clams and oysters, dried beans, maple syrup and molasses.

CALCIUM—FOOD SOURCES [11]

(Content per 100 grams edible portion)

RICH SOURCES	GRAMS	GOOD SOURCES	GRAMS
Almonds	.254	Artichoke, French	.039
Beans, shelled, dried, red kidney or navy	.148	Beans, snap or string	.065
Broccoli	.130	Cabbage, headed	.046
Buttermilk	.118	Carrot	.042
Cabbage, outer green leaves	.429	Celery	.072
Cheese, American Cheddar and Swiss	.873	Cheese, cottage	.082
Clams	.102	Chick pea	.092
Cocoa, dry	.112	Cowpeas, dried	.080
Collards	.249	Cream, 20 per cent	.097
Dandelion greens	.187	Eggs, whole	.054
Figs, dried	.223	Egg yolk	.157
Kale	.225	Endive, Escarole and French	.074
Milk, whole or skim	.118	Kohlrabi	.078
evaporated	.243	Lettuce, green	.062
condensed	.273	Maple Syrup	.163
dry, skim	1.300	Okra	.082
dry, whole	.949	Oysters	.068
Molasses, dark	.273	Parsnips	.057
Mustard greens	+++	Peanuts	.074
Olives, green	.101	Peas, dried	.073
Soybeans, shelled, dried	.227	Romaine	.062
Soybean flour, medium fat	.326	Rutabagas	.055
Turnip tops	.254	Salmon, canned	.067
Water cress	.168	Scallops	.090
		Shrimp	.075
		Soybeans, shelled, fresh	++
		Turnips	.040

[10] From MacLeod and Taylor, *op. cit.* By permission.
[11] Based on Sherman, *op. cit.* Tables of Food Composition, Committee on Food Composition of the Food and Nutrition Board, National Research Council, Washington, D. C., 1943.

PHOSPHORUS—For Strong Bones and Teeth

Phosphorus is also one of the most important elements in the body. Phosphorus is the most widely distributed in the body of all of the inorganic elements. It is found as the inorganic phosphate and in combination with organic compounds. The bones and teeth are estimated to contain about 70 per cent of the total amount, chiefly in combination with calcium, as calcium phosphate.

Phosphorus is also a part of every cell and has to do with all multiplication of body cells. It is particularly abundant in the cells of the brain and nerves. It is present in plasma and other body fluids.

Functions Phosphorus has many functions in the body: (1) It combines with calcium in building sound bones and teeth. (2) It forms part of the structure of every body cell. (3) It aids the work of glandular secretions. (4) In combination with carbohydrates, fats, and proteins it makes possible the utilization of these products. (5) It is an important constituent of complex compounds through which some of the vitamins function. (6) It helps maintain the slight alkalinity of the blood by means of the phosphates which it forms. A proper supply of calcium and phosphorus, and an abundance of vitamins A and D are needed for efficient utilization of both minerals.

Demonstration of the importance of phosphorus in the diet[12] These rats are twin brothers, 9 weeks old.

A. This rat did not have enough phosphorus. It grew slowly and weighed only 60 grams.

B. This rat had plenty of phosphorus, and weighed 115 grams.

[12] These illustrations are taken from charts prepared in the Bureau of Home Economics, U. S. Department of Agriculture, Washington, D. C.

Food sources Phosphorus is widely distributed in plants, as it is in the animal body. Many foods contain an abundance of it, and there is relatively little chance of the diet not containing an adequate supply.

PHOSPHORUS—FOOD SOURCES [13]

(Content per 100 grams edible portion)

RICH SOURCES	GRAMS	GOOD SOURCES	GRAMS
Barley, whole	373	Artichoke, globe or French	.094
Beans, shelled, dried, lima	.386	Bacon	.109
Cheese, American Cheddar	.610	Barley, pearled	.189
cottage	.263	Beans, fresh, Lima	.158
Swiss	.701	Beef, lean	.204
Cocoa, dry	.709	Broccoli, flower	.107
Cottonseed flour	1.193	Chicken	.218
Cowpeas or blackeyed peas	.411	Corn, green	.120
Egg yolk	.538	Cornmeal, whole	.152
Flour, graham or whole wheat	.306	Eggs	.224
Kidneys	.287	Farina	.125
Lentils, dry	.368	Fish and shellfish	Av. .200
Liver	.373	Flour, white	.101
Milk, dried	.723	Ham, medium lean	.151
Oatmeal or rolled oats	.365	Heart	.236
Peanuts	.392	Lamb or mutton	.208
Peas, dried	.397	Macaroni	.147
Pork, medium lean	.215	Meat, lean, or medium fat	.192
Rice, brown	.336	Oysters	.172
Rye flour	.278	Peas, fresh	.122
Soybean flour, medium fat	.619	Prunes, dry	.093
Wheat, whole	.374	Rice, polished	.092
shredded	.324	Turkey	.320
bran	1.215		

IRON—For Red Blood

Iron is present in the body in the approximate proportion of 1 part to 25,000. In a person weighing 150 pounds, this amounts to about one-tenth of one ounce. This small amount is nevertheless indispensable to bodily well-being, and the functions which it performs in the body are of fundamental importance.

At least 70 per cent of all the iron in the body is contained in the blood, where it exists as hemoglobin. Iron also forms a part of the nucleus of each body cell.

[13] Based on Sherman, *op. cit.* Also list of the Bureau of Human Nutrition and Home Economics, U. S. Department of Agriculture, Washington, D. C.

Food sources The problem of food sources of iron is somewhat different from that of the other mineral elements. The body exercises an economy toward its iron supply that is not true of other minerals. The life of the average red cell is approximately 6 weeks, after which it breaks down, with the consequent retention of the iron-containing faction for re-use in hemoglobin building.

The availability of iron from foods has been extensively investigated during recent times. Much evidence has been presented for the theory that there are significant differences in the availability of iron from different foods. The subject is still in a highly controversial state, and for this reason it seems best to ignore it until more convincing evidence is presented for one view or the other.

IRON—FOOD SOURCES [14]

(Content per 100 grams edible portion)

RICH SOURCES	GRAMS	GOOD SOURCES	GRAMS
Almonds	.0044	Beans, shelled, fresh, Lima	.0023
Apricots, dried	.0049	Beet greens	.0032
Beans shelled, dried red kidney	.0103	Broccoli leaves	.0014
Beans, shelled, dried lima	.0075	Chicken	.0019
Chard	.0040	Dandelions	.0031
Cowpeas, shelled, dried	.0078	Dates	.0021
Egg yolk	.0072	Eggs, whole	.0027
Flour, whole wheat	.0038	Figs, dried	.0031
Heart, beef	.0062	Kale	.0022
Lentils, dried	.0083	Meats, lean or medium fat (beef, veal, or pork)	.0025
Liver	.0121	Prunes	.0039
Molasses	.0067	Raisins	.0030
Mustard greens	+++	Spinach	.0034
Oatmeal or rolled oats	.0052	Turkey	.0038
Oysters	.0071	Turnip greens	.0024
Peaches, dried	.0069	Water cress	.0026
Peas, dried	.0060		
Rye flour, whole	.0048		
Soybean flour, medium fat	.0130		
Wheat, whole	.0038		
shredded	.0038		
bran	.0078		

Functions Iron functions in the body as a constituent of: (1) the oxygen-carrying hemoglobin; (2) chromatin substances essential to the

[14] Based on Sherman, *op. cit.* Also list of the Bureau of Human Nutrition and Home Economics, U. S. Department of Agriculture, Washington, D. C.

activity of cells; and (3) substances concerned with oxidation reduction systems in the body.

Hemoglobin is an iron-bearing protein which forms a large part of the red blood corpuscles. It combines with oxygen and so carries this vital element to the lungs and other body tissues. Since oxygen constitutes some 65 per cent of body weight and is essential to life itself, the importance of this function of iron is apparent.

Recently it has been shown that copper is involved in some way in the formation of hemoglobin. Copper does not actually enter into the structure of hemoglobin, and its action in hemoglobin formation is supposed to be catalytic in nature.

When the iron content of the body falls below normal, the body is anemic. Thus studies of the supply of iron in the diet have been closely associated with studies of anemia. Not all types of anemia are due to deficiency of iron, and this must be kept in mind in formulating a concept of the anemias, since treatment varies widely depending upon the type.

OTHER MINERALS

Iodine The amount of iodine in the body is very small. Whereas iron constitutes about 1 part in 25,000 of body weight, iodine makes up only 1 part in about 2,800,000. The iodine in a human body weighing 150 pounds is estimated to be about 25 milligrams, an amount equivalent to less than one-thousandth of an ounce. Yet without this minute amount, the thyroid gland fails to function as it should, ultimately enlarges, and simple goiter results.

Little is known as to the exact amount of iodine needed by the body. Sherman says, "Von Fellenberg estimates that the normal human adult requires about 0.000014 gm. of iodine daily and that, when larger amounts are furnished by the food and drink, an easily mobilized reserve store of iodine is built up in the body."[15]

Iodine is found chiefly in sea water, hence in sea foods and in sea salt not too highly refined. It is present also in soils in areas adjacent to the sea coast, hence in water from such regions, as well as to some extent in the plant and animal products.

Iodine is lacking in the water and soil of certain inland areas, such as the country near the Great Lakes and parts of the Rocky Mountain

[15] *Op. cit.* By permission of the publishers.

regions and in food products produced there. Simple goiter is common, and these regions have come to be known as "goiter belts."

Since overdoses of iodine may be harmful, iodine preparations should be taken only under the direction of a physician.

Copper It has been demonstrated that a very small amount of copper aids in the utilization of iron in building hemoglobin. Sufficient copper for the body needs seems to be supplied by the foods of the ordinary mixed diet.

Sodium and chlorine These elements are present in the body as sodium chloride, or salt. This is the source of chlorine in the hydrochloric acid of the gastric juice. Salt in the body fluids helps to maintain proper osmotic pressure. Salt is lost in perspiration, and an adequate intake should be assured each day to balance this loss, especially when perspiration has been excessive. The intake of too-large amounts of salt over body needs should be avoided, as it may have deleterious effects.

Potassium and magnesium These minerals are so widely distributed in foods and such small amounts are needed by the body that they are adequately supplied by a varied diet.

Sulphur Sulphur is contained in almost all proteins, so that a diet which includes a variety of protein-rich foods in sufficient quantities to meet the body need for protein, will also furnish a sufficient supply of sulphur.

Zinc and cobalt Recent investigations show that these elements may be nutritionally essential. Exact knowledge of their function, however, awaits results from further experimentation.

ACID- AND ALKALINE-ASH FOODS

Acid-base balance Normal human blood is neutral in its reaction, or very slightly alkaline, and must remain so within very narrow limits if life is to continue. The mineral elements in food help to maintain this condition and to keep a normal acid-base balance in the body as a whole.

Whenever food is burned within the body, the mineral elements, being incombustible, remain as an ash. This ash is acid or alkaline, depending on what minerals predominate in the food.

A well-balanced diet will supply more than enough alkaline ash to counteract the acid ash and will thus preserve a proper acid-base balance. It is only when the diet is greatly unbalanced or in certain dis-

eased conditions that the alkaline reserve is depleted and acidosis results.

There is some question as to the importance that should be given to selecting foods on the basis of their content of acid- and base-forming elements. Unless a diet is highly unbalanced continuously over a considerable period of time, there would probably be little tendency toward imbalance. The blood as a tissue is well equipped through its content of amphoteric proteins—materials capable of acting in the capacity of base or of acid—and also of phosphates, to resist sudden changes in its acid-base equilibrium. This property is known as the buffer value of blood, or it may be said that the blood is highly buffered. The property of the buffering action of blood has received considerable study, and it is largely because of this that diet in acid-base balance in the body has been given such prominence. Most, and perhaps all, of the other body tissues are considerably less alkaline than blood plasma; and some organs during active metabolic process may show a definite acid reaction. This should indicate that there is still much to learn about the practical significance of the proportions of acid and base-forming elements in the diet.

In general, foods may be divided as follows:

Acid-forming foods

1. Meat 2. Fish 3. Poultry 4. Cereals

Base-forming foods

1. Vegetables 2. Nuts 3. Fruits (except prunes, plums, and cranberries) 4. Milk

The following tables show foods which contain principally acid- or base-forming elements.[16]

In calculating these tables, "the amounts of chlorine, phosphorus, and sulphur present were expressed as the equivalent number of cubic centimeters of normal acids; the amounts of calcium, magnesium, potassium, and sodium present were expressed as the equivalent number of cubic centimeters of normal alkali; and the excess of acid or base was obtained by difference." [17]

[16] Other tables of acid- and alkaline-ash foods will be found in the Appendix.
[17] Sherman, *op. cit.* By permission of the publishers.

FOODS IN WHICH ACID-FORMING ELEMENTS PREDOMINATE [18]

FOOD (EDIBLE PORTION)	APPROXIMATE POTENTIAL ACIDITY (CC. NORMAL ACID)	
	Per 100 Grams	Per 100 Calories
Beef, clear lean	12	10
round steak	11	7
Eggs	11	7
Oysters	15	30
Oatmeal	12	3
Rice	9	2
Wheat, entire	12	3
Wheat flour	9	2
White bread, made with water	6	2

FOODS IN WHICH ALKALINE-FORMING ELEMENTS PREDOMINATE [19]

FOOD (EDIBLE PORTION)	APPROXIMATE POTENTIAL RESERVE ALKALINITY (CC. NORMAL ALKALI)	
	Per 100 Grams	Per 100 Calories
Apples	3	6
Bananas	8	8
Beans, dried	10	3
string, fresh	5	13
Beet, fresh	10	25
Cantaloupe	7	18
Carrots	14	30
Citron	9	3
Dates	9	3
Lemon or juice	4	10
Olives	45	18
Onions	1	2
Orange or juice	5	10
Pears, fresh	4	5
Potatoes	9	10
Radishes	5	23
Rutabagas	8	29
Sweet potatoes	6	5
Tomatoes	5	24
Turnips	11	33
Watermelon	4	12

[18] Sherman, *op. cit.* Reprinted by permission.
[19] See also Appendix.

QUESTIONS FOR STUDY

1. By what other names are mineral elements sometimes known?
2. What is meant by mineral elements?
3. Construct a simple menu which will supply adequate minerals.
4. In what three kinds of ways do mineral elements function in the body?
5. What three mineral elements are most likely to be deficient in the ordinary diet? Give the dietary standard requirement of each.
6. Discuss the importance of calcium to the body. Of phosphorus. Of iron. Of iodine.
7. What functions does each perform?
8. Name some common food sources of each.
9. Discuss the acid-base balance.

WATER—Regulates Body Processes, Constitutes an Important Part of the Body

The importance of water to the human body can hardly be overestimated. Approximately two-thirds of the body is water.

Every half-pound of muscle, liver, and kidney contains nearly a drinking glass of water; brain tissue has a larger content; while even bone is more than one-third water.

No cell can function if it is dry, and most cells require a constant bathing in fluid.

Water forms a large part of the blood, which carries nourishment to the cells, and also of the urine, which flushes away their waste products. The constant circulation of about 10 pounds of water is required in these processes alone.

Without moisture in the tissues of the lungs, oxygen cannot be taken in nor carbon dioxide thrown off.

Man can live for days without food but dies within hours without water. According to Rubner's [20] estimate, practically all the body's stores of glycogen and fat, and even half of its protein, can be lost without great danger to life; but a loss of 10 per cent of body water is serious, and a loss of 20 per cent is scarcely to be endured.

Composition Water is composed of hydrogen and oxygen, two atoms of hydrogen uniting with one atom of oxygen to form one molecule of water. Hence its chemical formula, H_2O.

[20] MacLeod and Taylor, *op. cit.*

Water boils at 212° F. and freezes at 32° F. It evaporates constantly at ordinary temperatures.

Functions Water is an essential constituent of every part of the body. Its functions in the body are regulatory, its usefulness as a regulator of body processes being based chiefly on its power as a solvent and its capacity for carrying heat. Water furnishes no energy to the body.

The functions of water are:

1. To dissolve food materials in the course of digestion, thus making possible their absorption by the blood and lymph.
2. To carry products of the digestion of food to various parts of the body.
3. To serve as a medium for various chemical changes.
4. To aid in the removal of waste.
5. To act as a lubricant.
6. To regulate body temperature.

The evaporation of water from the skin tends to keep the body temperature normal. This is a constant process known as "insensible perspiration." Only by reason of heat or exercise does perspiration ordinarily become visible.

Sources The chief ways in which the body obtains water are: (1) through drinking water and other beverages; (2) from foods which contain water—especially fruits and vegetables; and (3) through the combustion of food within the body.

The first source is obvious. The second source becomes obvious when it is remembered that fruits and vegetables are from 85 to 95 per cent water, lean beef and eggs about 80 per cent, cheese and bread from 30 to 40 per cent, and even cereals and crackers from 6 to 10 per cent.

The third source, although not so obvious, is still important. Combustion, either outside or inside the body, always produces carbon dioxide and water. This water may be seen condensed on a cold surface held either in a flame or before the mouth while exhaling. The oxidation of 100 grams of fat in the body produces 107 grams of water; 100 grams of protein will yield 41 grams of water.

Water balance The body is said to be in water balance when the intake of water equals the output. Ordinarily as much as 2½ quarts of water are lost daily (1) through the kidneys, as urine; (2) through the lungs, as vapor; and (3) through the skin, as perspiration. These losses must be replaced, and the body should receive from 4 to 8 glasses

of water daily in addition to that contained in food. This may be taken as follows:

On rising	1 or 2 glasses
Before or with each meal, 1 glass	3
During forenoon	1
During afternoon	1
On retiring	1
	8

Water may be taken with meals if not too cold and if not used to wash down unmasticated food. It stimulates the secretion of the gastric juice and improves digestion in other ways, while the dilution of the intestinal contents renders them more easily absorbed.

Excess and deficiency Too much water may in certain circumstances place too great a burden on organs already damaged by disease. The normal individual need not fear that he is drinking too much water.

Too little water interferes with both the physical and the chemical body processes so essential to health and even life. A deficiency is likely to cause constipation and to reduce the quantity of urine, both of which in turn affect adversely the elimination of waste from the body.

If the deficiency continues, the body will tend to lose weight; and if the supply of water is cut off completely for any reason, death results in a comparatively short time.

QUESTIONS FOR STUDY

1. Give the chemical composition of water.
2. Why is water so important to the body?
3. Give the principal functions of water in the body.
4. What are the body's three chief sources of water?
5. What is meant by water balance?
6. How much water should one drink daily?
7. What effect on the body has too much water? Too little? Complete lack?

VITAMINS—Essential for Growth and Regulation of Body Processes

Vitamins are natural constituents of food which are absolutely essential to health and well-being. These substances occur in foods in almost

infinitesimal amounts and take part in body processes in correspondingly small quantities.

Each vitamin is a distinct individual chemically, and each performs a specific function in the body. They have been grouped together under the term "vitamin" more or less accidentally as a result of the way they were discovered. The existence of these important food constituents was recognized definitely in 1911; but the illnesses, now known as deficiency diseases, following from the use of diets containing inadequate amounts of several of these constituents, had been observed long before that date.

An adequate intake of each of these essential substances is especially important during the period of growth, and also for reproduction and lactation; but the supply must be sufficient at all times if normal body function is to be maintained.

So far as is known, the human body is not capable of fabricating any of them within its own tissues—unless we consider vitamin D an exception, which is not entirely justified, since the precursor of the vitamin, or provitamin D, must be supplied to the body.

The long-continued use of a diet containing an amount of any vitamin far less than the amount required for good nutrition leads to characteristic illness referable to that vitamin only. Thus scurvy is associated with the consistent use of a diet containing very little or no vitamin C. Rickets follows from a deficiency of vitamin D, and certain symptoms of pellagra are alleviated by adding nicotinic acid to the diet. Vitamins have been discovered through the recognition of such diseases and the study of the substances in foods by which their occurrence is prevented or individuals suffering from them are cured.

With the knowledge we now have of the vitamin-deficiency diseases, their diagnosis is a relatively simple matter and the treatment to be prescribed more or less routine. From this standpoint the case of an individual suffering from the results of a deficiency of a single vitamin is not so serious. However, there is reason to believe that cases of multiple vitamin deficiency may occur as often if not more frequently than the simple avitaminoses. In the case of multiple vitamin deficiency, the only symptoms may be loss of appetite, generally lessened efficiency, and lowered resistance to infection—or, in other words, general signs of undernutrition in no sense specific. Such cases give added emphasis to the need for having practical knowledge of the vitamins and the food sources of each.

During recent years the combined results from the studies of a number of investigators have thrown considerable light on the highly complex processes within the body in which several of the vitamins function. This phase of vitamin research promises much of interest for the future.

Essential vitamins At the present time it may be said that man requires 8 vitamins, in the sense that the specific symptoms resulting from a deficient intake of and alleviated by administration of each of these are known. These 8 essential vitamins include:

Vitamin A Vitamin D Vitamin K Vitamin E	soluble in fat
Ascorbic acid or Vitamin C	soluble in water
Thiamine or Vitamin B_1 Riboflavin or Vitamin B_2 (G) Nicotinic Acid Niacin	The "B" vitamins, or members of the vitamin B complex, all soluble in water

Experiments with several species of animals as well as bacteria have shown the existence of a relatively large number of other vitamin substances essential in nutrition. Several of these are already assumed to be essential for man, although definite proof is not at hand, and undoubtedly a number of them will come to be included in the list of essential nutrients when more is known of their functions.

Expressing vitamin values As soon as the existence of the first vitamins—vitamin A, vitamin B, and vitamin C—was admitted, interest was shown in methods for measuring the amounts contained in foods. The chemical identity of these vitamins was not known, and the usual chemical methods of quantitative measurement on the basis of weight could not be applied. As an expedient it became the custom to express relative values in terms of responses—such as growth—of small laboratory animals.

This method was cumbersome and not very exact. With the growing

interest in vitamin research, the problem became an important one; and in 1932 was referred to the Health Organization of the League of Nations. As a result of this action, Standards of Reference were established for vitamins A, B, C, and D. The unit quantities of these international standards used for determining and expressing values are known as International Units (I.U.). Corresponding quantities of standards selected by the United States Pharmacopeia are known as United States Pharmacopeia (U.S.P.) units. The recognition of vitamin B_2, or G, was followed so closely by its identification as riboflavin that its quantitative occurrence has been expressed by weight, and no International Unit was devised for it; although a Standard of Reference is available.

It is now generally the custom to express vitamin values, including those for vitamin B (thiamine) and vitamin C (ascorbic acid) in terms of weight of the pure vitamin measured against the Standards of Reference. Values for vitamin C are usually given as milligrams (.001 gram), and those for the members of the vitamin B complex as milligrams or micrograms (.001 milligram). Values for vitamin A are still expressed as International Units. Pure vitamin A is relatively unstable at ordinary temperature; and, although it is available and in use by some investigators, no preparation has been accepted as a Standard of Reference to replace the original Beta Carotene Standard. There is still much uncertainty as to the efficiency of conversion of carotene to vitamin A in the body, so that values for vitamin A derived in terms of the Beta Carotene Standard cannot be expressed in weight of vitamin A. Much the same situation holds for vitamin D, quantitative values for which are still given in International Units, since the form of vitamin D in the International Standards of Reference is different from naturally occurring vitamin D.

Vitamin units defined:

Vitamin A: The International unit is the vitamin A activity of 0.6 microgram (0.0006 milligram or 0.000,000,6 gram) of pure beta carotene.

Thiamine (*vitamin B_1*): The International unit is the vitamin B_1 activity of 3.0 micrograms (0.003 milligram or 0.000,003 gram) of pure crystalline vitamin B_1 hydrochloride.

Ascorbic acid (*vitamin C*): The International Unit is the vitamin **C** value of 0.05 milligram (0.000,05 gram) of 1-ascorbic acid.

Vitamin D: The International unit is the vitamin D activity of 1.0 milligram (0.001 gram) of the International Standard irradiated solution of ergosterol in oil.

Nicotinic acid (niacin): Values given as milligrams or micrograms.

Vitamin E: The International unit is the vitamin E activity of 1.0 milligram (0.001 gram) of the standard preparation of synthetic alpha-tocopherol acetate.

Riboflavin (vitamin G): Values given as milligrams (.001 gram) or micrograms (.001 milligrams). The Sherman Unit, no longer in good usage, was based on animal growth and is equivalent, approximately, to 3.0 micrograms riboflavin.

Food sources Foods are the natural sources of vitamin value. Foods vary greatly both in the kinds and amounts of vitamins they contain. Few, if any, contain significant amounts of all of the vitamins. On the other hand, most natural foods have some vitamin value.

Much interest is being shown at the present time in studies to determine the factors that influence the vitamin content of foods. It is generally true that the same vitamins will be found in different samples of any one kind of food, but it is not equally true that the concentration of these vitamins is the same from sample to sample. In foods of plant origin, for instance, vitamin content apparently has a distinct relation to variety. Soil and climatic conditions may also have some influence. In foods of animal origin, the food given the animal is of importance. Knowledge of this kind is of especial significance in food-production programs designed to furnish the maximum in nutritive value.

Several of the vitamins are easily lost from foods or destroyed when the foods are stored or prepared and served. This makes it necessary to know how to treat foods so as to conserve maximum value until they are eaten. Some vitamins are destroyed by oxidation; some are readily soluble in water and may be removed from the food if it is cooked in water. There are many studies under way in an attempt to learn how different foods should be cooked to retain the most in vitamin value and to reduce unavoidable losses to a minimum. From a practical standpoint a few general rules are usually sufficient:

1. Vitamin value is lost or may be lost during storage of food. Fresh foods are therefore to be preferred. Frozen foods retain vitamin value well and may be considered the equivalent of fresh, always remember-

ing to interpret fresh in its true meaning. Losses during canning may be kept low, but canned foods lose vitamin value during storage and therefore should not be stored too long.

2. Loss of vitamin value takes place more rapidly at high temperatures. Foods should be cooked only so long as necessary to make them palatable and should be served as soon as conveniently possible after they are cooked.

3. Several vitamins are soluble in water, and when foods are cooked in water these vitamins may go into solution in the water. This loss can be avoided, it is frequently suggested, by using small quantities of water for boiling foods and using this cooking water. Another suggestion is to cook by steaming when permissible.

4. In many foods the highest concentration of vitamins is found in parts that are discarded during preparation of the food. Food preferences make this a somewhat difficult problem to overcome, but it is well to keep it in mind and avoid wastage if possible.

VITAMIN A—For Growth, for Teeth, for Eyes, for Epithelial Tissues

Antiophthalmic—$C_{20}H_{30}O$—Fat-soluble

Properties Vitamin A is soluble in fat but not in water and has been isolated in the form of pale yellow crystals. In its chemical structure it is an alcohol.

Functions The functions of vitamin A (or precursor) are: (1) to maintain general health; (2) to promote normal growth; (3) to maintain normal vision, especially in dim light; (4) to support normal reproduction; (5) to maintain the integrity of the epithelial tissues; and (6) to promote resistance to infection.

That it does these things has been repeatedly proved by laboratory experiments. Hence an abundant supply of this vitamin is necessary for well-being at all ages.

Effect of a deficiency Vitamin A may be supplied in sufficient amounts to support growth and maintain apparent good health and still be insufficient to meet all the body's demands. Consequently a liberal amount should be included in the diet.

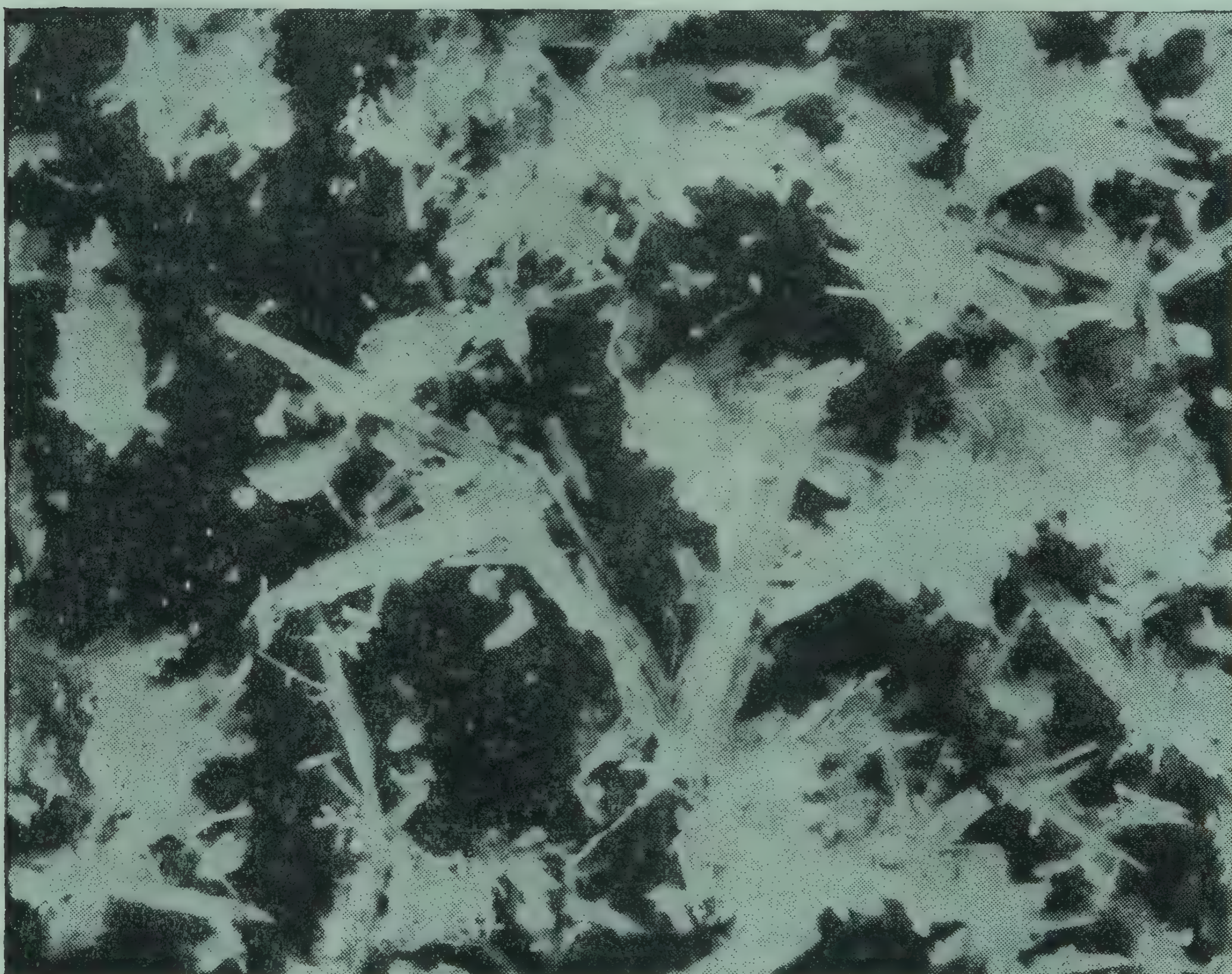
When this vitamin is absent from the diet, or present only in small amount, the results are:

1. Subnormal growth in children; general weakening of the body in adults.

2. Development of night-blindness, or inability to see objects readily in dim light.

3. Replacement of secreting cells in the lining surfaces of glands, ducts of glands, and their surfaces throughout the body by horny, non-secreting cells. This may result in increased susceptibility to infections, especially of the respiratory tract, the sinus, the ears, the glands of the mouth and throat, and in some instances the kidneys and bladder.

4. Development of the disease of the eyes known as xerophthalmia.



Crystals of low-melting vitamin A alcohol, magnified 24 times. (*Courtesy,* Distillation Products, Inc., Rochester, N. Y.)

Vitamin A is particularly important in the diet of children. Adults do not show a lack of this vitamin as quickly as do growing children, partly because they require less and partly because the body has had a chance to store a considerable amount for future use. Eventually, however, if the diet is deficient in this vitamin, adults also will give evidence of impaired health and nutrition.

Storage in the body If a diet furnishes more of vitamin A than the body needs, the surplus is stored in the body tissues, about nine-tenths

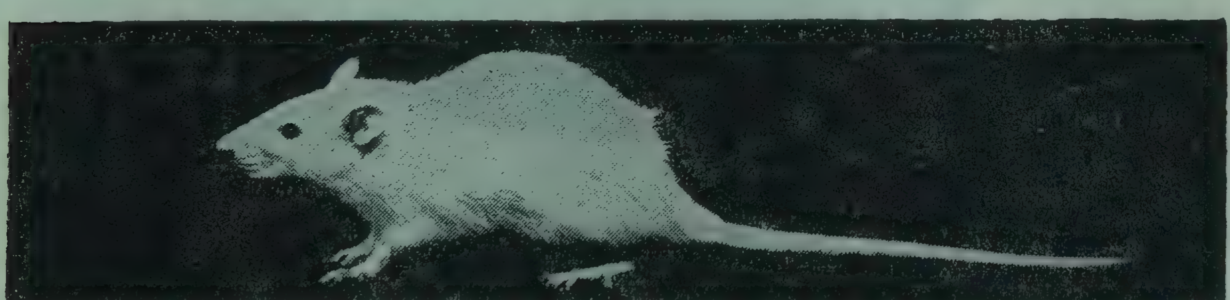
being found in the liver and the remaining one-tenth about equally divided among muscles, blood, kidneys, and lungs.

The body has this power of storing vitamin A from birth. The infant at weaning may have a sufficient storage of this vitamin to enable it to grow for some time, even on a diet deficient in vitamin A.

The adult may have a store of this vitamin sufficient to carry him over considerable periods of deficient intake. This is no reason, however, for neglecting to provide abundant quantities of vitamin A in the diet of the adult as well as the growing child, for one cannot be sure that the previous diet has supplied enough to permit of storage.

Effect upon growth[21] Vitamin A made the difference in these twin rats, 11 weeks old.

A. This rat had no vitamin A. It weighed only 56 grams. Note the infected eye, rough fur, and lack of vigor.



B. This one had plenty of vitamin A and weighed 123 grams. It has bright eyes and sleek fur and is vigorous.

Food sources Vitamin A as such is not found in foods of plant origin. The vitamin A value in such foods is present in the form of plant pigments—carotenes—which in the animal body are broken down in the liver to yield vitamin A. Carotenes are responsible for the orange-yellow color of carrots. The three that serve as sources of vitamin A are differentiated as alpha, beta, and gamma, beta carotene being the

[21] These illustrations are taken from charts prepared in the Bureau of Home Economics, U. S. Department of Agriculture, Washington, D. C.

most important from the standpoint of the amount of vitamin A yielded. The related substance, cryptoxanthin, also has vitamin A value. These four substances are sometimes referred to as *provitamins,* or the precursors, of vitamin A.

Crystals of beta carotene, or provitamin A. (*Courtesy,* Hoffmann La Roche, Inc., Nutley, N. J.)

The bright color of the carotenes is a means of identifying foods as probable rich sources of vitamin A. Thus yellow corn and yellow sweet potatoes are better sources than white corn and pale-yellow or white sweet potatoes. Green foods also have a high content. Thin green leaves are the richest food sources of vitamin A value. Bleached leaves contain little or no vitamin A.

Vitamin A is found in high concentration in milk, cream, butter, cheese made from whole milk or cream, egg yolk, liver and liver oils, especially fish-liver oils such as cod, tuna, and halibut.

Unlike vitamin A, carotene is more readily soluble in water than in fats; and oils derived from plants—olive oil, cottonseed oil, peanut—

have very little vitamin A value. Lard is low in its content of vitamin A.

Stability in foods Vitamin A is resistant to heat, and the vitamin A value of foods is not reduced to any appreciable extent during cooking or canning.

Animal fats lose their vitamin A content gradually by oxidation if exposed to the air and more rapidly if heat is applied. Oxidation also lowers the vitamin A value of dried foods during storage.

VITAMIN A—IN AVERAGE SERVINGS *

INTERNATIONAL UNITS

EXCELLENT (VITAMIN A CONTENT 5000 OR MORE INTERNATIONAL UNITS PER AVERAGE SERVING OF FOOD)

GRAMS	FOOD	AVERAGE SERVING	INTERNATIONAL UNITS
100	Beet greens	⅝ cup or 3 hp. tbsp. cooked	15,000
100	Broccoli	¾ cup	9,000
100	Carrots	¾ cup cubed or 1 large	10,000
100	Chard	3⅓ oz. or ¾ cup cooked	10,000
5	Cod liver oil	1 tsp.	see container
100	Collards	½ cup cooked	12,000
100	Dandelion greens	½ cup cooked	12,000
100	Escarole	4 leaves	10,000
100	Kale	½ cup cooked	16,000
100	Lettuce, green	6 large leaves	5,000
100	Liver, average	3 slices, 2″ x 1″ x ¼″	27,000
100	Mustard greens	½ cup cooked	10,000
100	Spinach	1½ cups or 2 heads	18,000
100	Turnip greens	½ cup cooked	18,000

GOOD (VITAMIN A CONTENT 500 TO 5000 INTERNATIONAL UNITS PER AVERAGE SERVING)

GRAMS	FOOD	AVERAGE SERVING	INTERNATIONAL UNITS
50	Apricot, dried	8 small halves or ¼ cup	3,500
100	Asparagus, green	8 stalks, 4″ long	900
100	Beans, snap, green	⅔ cup or ½ cup cooked	1,500
100	Beans, shelled, fresh, lima	½ cup or 4 r. tbsp.	500
100	Beans, shelled, fresh, runner	⅔ cup or ½ cup cooked	500
100	Brussels sprouts	⅔ cup or 9 medium	500
50	Cabbage, Chinese	¾ cup shredded	4,500
200	Cantaloupe	½ melon, 5″ diameter	2,000
100	Celery, green	4 medium stalks, or ¾ cup cooked	1,000
100	Cheese, cream	6 tbsp.	2,000
100	Corn, yellow	⅜ cup cooked or 1 medium ear	600

* For further values, see Table 1, page 637.

VITAMIN A—IN AVERAGE SERVINGS—Continued

GOOD (VITAMIN A CONTENT 500 TO 5000 INTERNATIONAL UNITS PER AVERAGE SERVING)

GRAMS	FOOD	AVERAGE SERVING	INTERNATIONAL UNITS
100	Cowpeas, fresh	½ cup	500
32	Egg, yolk	2 average	896
100	Egg, whole	2 average	1,000
100	Kidney (beef, veal or lamb)	½ cup cubed	1,000
100	Leek	1 cup of ½″ pieces	1,000
50	Lettuce, romaine or cos	3 large leaves	500
100	Mangoes	1 small	1,000
100	Okra	½ cup	2,000
20	Onion, green shoots	4 small, 5″ long	1,000
100	Papaya, ripe	¼, 5″ diameter	2,500
5	Parsley	1 sprig	900
100	Peas, green, fresh	½ cup scant	1,000
100	Peaches, yellow, fresh	1 large	2,000
85	Peaches, yellow, dry	5 or 6 halves	3,000
100	Peppers, sweet, green	1 medium	3,000
100	Peppers, sweet, red	1 medium	2,000
100	Prune, fresh	3 large	1,500
50	Prune, dried, A. P.	6 prunes, 50/60s	1,250
100	Pumpkin	½ cup cubed	2,000
100	Salmon, Pacific, canned	½ cup flaked	565
100	Squash, summer	½ cup or 4 r. tbsp. cooked	750
100	Squash, winter	½ cup or 4 r. tbsp. cooked, mashed	4,000
100	Sweet potato	⅓ cup or 1 small	5,000
100	Tomato, mature, green	1 medium	800
100	Tomato, mature, ripe	1 medium, ½ cup cooked	1,000
100	Tomato juice, fresh	½ cup	1,000
25	Water cress	10 pieces	1,000

VITAMIN A—IN AVERAGE SERVINGS—Continued

FAIR (VITAMIN A CONTENT 160-500 INTERNATIONAL UNITS PER AVERAGE SERVING)

GRAMS	FOOD	AVERAGE SERVING	INTERNATIONAL UNITS
100	Artichoke, French	2, 3" in diameter	200
100	Avocado	½ small	400
100	Banana	1 medium	350
10	Butter, average	2 tsp.	400
20	Cheese, cheddar	1" cube	330
100	Clams	4 medium long or 6 medium round	200
100	Beef, heart	1 slice 2" x 3" x 1"	200
100	Oysters	7 medium	200
30	Peas, green, dried	3 tbsp.	225
100	Plums	3, 1½" diameter	350
100	Salmon, canned, Pacific red	½ cup flaked or 1 piece 3" x 2½" x 2½"	245
100	Soybeans	½ cup	200

THIAMINE—VITAMIN B_1—For Good Appetite and Good Muscle Tone

Antineuritic—$C_{12}H_{18}N_4Cl_2SO$—Water-soluble

Properties Thiamine, or vitamin B_1, has been isolated as a white crystalline solid containing one atom of sulphur in its molecule. This vitamin is very soluble in water.

Functions The functions of vitamin B_1 are: (1) to promote growth, (2) to stimulate appetite, (3) to aid in maintaining normal digestive tone, (4) to regulate normal functioning of the nervous system, and (5) to promote normal reproduction and lactation.

Effect of a deficiency A *partial* deficiency in this vitamin results in:

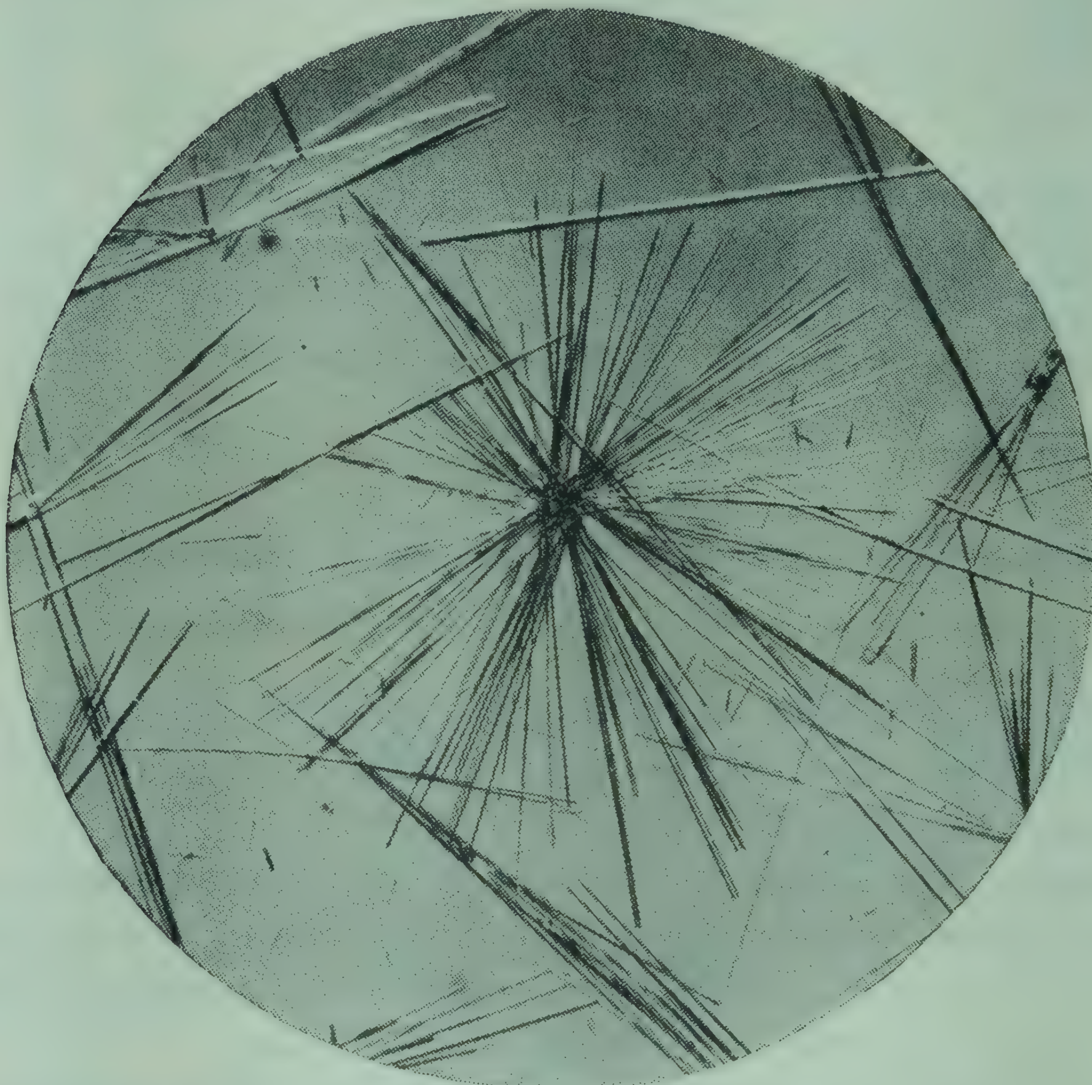
1. Loss of appetite, general listlessness, and nervous irritability.
2. Decline in weight.
3. Loss of vigor.
4. Diminished neuro-muscular tone of the intestine, leading to constipation.

A *complete* or very marked deficiency leads to:

1. Development of the disease known as beriberi, or polyneuritis.
2. Changes in reproductive organs of both sexes, with resultant sterility.

Beriberi or polyneuritis is a disease marked by a degeneration of the

nervous system, with resultant paralysis and frequent death from heart failure. It occurs chiefly in the Orient among people who live too largely on polished rice or other highly refined foods. It may be both prevented and cured by using unpolished rice or by adding some other source of vitamin B_1 to the diet.



Crystals of thiamine hydrochloride. (*Courtesy,* Abbott Laboratories, North Chicago, Ill.)

The changes in the reproductive organs induced by a lack of vitamin B_1 are marked, and it is now recognized that successful reproduction and lactation require an even larger amount of vitamin B_1 than is necessary for growth and the maintenance of health.

Storage in the body Vitamin B_1 is not stored to any appreciable extent.

Effect upon growth [22] Vitamin B_1 made the difference in this rat, 24 weeks old.

[22] These illustrations are taken from charts prepared in the Bureau of Home Economics, U. S. Department of Agriculture, Washington, D. C.

A. This rat did not have enough vitamin B_1. The lack of muscle control is called spastic paralysis.

B. The same rat 24 hours later, after receiving a food rich in vitamin B_1. Already it has recovered muscle control.

Food sources Thiamine is present in many different kinds of foods, but there are few concentrated sources. In cereals the vitamin resides in the germ portion. Since this is removed during refining, highly milled cereals and flours contain little of their original vitamin B content. The legumes—peas, beans, and especially soybeans—are good sources. Vegetables as a whole should be reckoned as important sources, not because of their absolute content of vitamin B, but on the basis of the quantities eaten. Fruits as a rule are low in vitamin B content and do not contribute important amounts unless eaten in relatively large quantities. Meats, especially those from glandular organs, are good sources. For some reason, not yet fully understood, pork has a content several times that of other muscle meats. Milk contains a significant amount, but some of this—10 to 15 per cent—may be lost in pasteurization. In eggs the vitamin is found in the yolk in fair amounts. Dried yeast is the richest natural source of vitamin B.

Stability in foods Thiamine in foods is destroyed by heat, and the rate of destruction is proportionate to the length of time of heating the temperature and the degree of alkalinity of the material in which it is

contained. Dry heat is more destructive than moist heat. These facts support the recommendation that such foods as meats and vegetables should not be overcooked. Soda should not be added to vegetables, since it tends to increase alkalinity.

Thiamine is very soluble in water; and, although the vitamin in foods is present in more or less complex combination, considerable may be dissolved out in the cooking water when foods are boiled, especially if they are cooked a long time in large amounts of water.

Some vitamin B is lost from drying, but the amounts vary considerably with conditions such as time and temperature of heating, and it is difficult to make any general statement. In canning, the greatest loss probably takes place during blanching.

THIAMINE—IN AVERAGE SERVINGS *

EXCELLENT (VITAMIN B1 CONTENT 400 OR MORE MICROGRAMS PER AVERAGE SERVING)

GRAMS	FOOD	AVERAGE SERVING	MCGMS.
100	Beans, shelled, fresh soybean	½ cup	500
100	Cowpea, fresh	½ cup	400
100	Ham, smoked	4 slices, 4½″ x 4″ x ⅛″	972
100	Heart, beef	1 slice, 2″ x 3″ x 1″	600
100	Liver (average)	3 slices, 2″ x 1″ x ¼″	400
100	Pea, green, fresh	½ cup	400
100	Pork muscle, lean	1 large chop	1,200

GOOD (VITAMIN B1 CONTENT 400-151 MICROGRAMS PER AVERAGE SERVING)

GRAMS	FOOD	AVERAGE SERVING	MCGMS.
100	Asparagus, green, bleached	8 stalks, 4″ long	180
100	Beans, shelled, fresh, lima	½ cup or 4 r. tbsp.	300
30	Beans, shelled, dried, lima	3 tbsp.	158
100	Beans, shelled, fresh, runner	½ cup	300
30	Beans, shelled, dried, navy	3 tbsp.	153
30	Beans, shelled, dried, soybeans	3 tbsp.	360
30	Cowpea, dried	3 tbsp.	180
100	Kidney, beef or veal	½ cup cubed	250
100	Kidney, lamb	1 whole	300

* For further values, see Table 1, page 637.

THIAMINE—IN AVERAGE SERVINGS—Continued

GOOD (VITAMIN B_1 CONTENT 400-151 MICROGRAMS PER AVERAGE SERVING)

GRAMS	FOOD	AVERAGE SERVING	MCGMS.
100	Lamb muscle, lean	2 slices, roast	200
100	Oyster	7 medium	200
30	Pea, green, dried	3 tbsp.	158
100	Pea, green, frozen	½ cup	320
100	Salmon, fresh, Atlantic	1 slice, 4" x 1½" x 1"	200
30	Wheat, hard	3 tbsp.	158

FAIR (VITAMIN B_1 CONTENT 150-70 MICROGRAMS PER AVERAGE SERVING)

GRAMS	FOOD	AVERAGE SERVING	MCGMS.
30	Beans, shelled, dried red kidney	3 tbsp.	135
30	Brazil nuts	4 medium	150
100	Brussels sprouts	⅔ cup, 9 medium	150
100	Cauliflower	⅔ cup or ¾ cup cooked	150
100	Chicken, muscle, dark	1 leg, meat only	150
100	Eggs, whole, average	2 eggs	145
32	Egg yolk	2 average	134
100	Kale	½ cup cooked	150
30	Lentils, dried	2½ tbsp.	150
220	Milk, fresh, whole, pasteurized	1 glass	70
20	Oats, rolled or oatmeal	3½ tbsp., dry	120
15	Pecan	5 nuts, large	75
100	Salmon, Pacific, canned	1 piece, 3" x 2½" x 2½"	80
15	Walnuts, English	3 or 6 halves	69

ASCORBIC ACID—VITAMIN C—For Healthy Gums and Teeth

Antiscorbutic—$C_6H_8O_6$—Water-soluble

It was noted as early as the middle of the eighteenth century that "something contained in the natural juices of the plant" had a beneficial effect on scurvy, long a common disease of northern Europe. This substance we now know as vitamin C, and as a consequence of its discovery scurvy has become a very rare disease.

Properties Vitamin C has been isolated in the form of a white crystalline material that resembles the carbohydrates in its structure.

Crystals of ascorbic acid. (*Courtesy,* Hoffmann La Roche, Inc., Nutley, N. J.)

Functions Vitamin C functions in maintaining the continuity of the intercellular material and especially that of the connective tissue throughout the body. It also functions in cell respiration.

Effects of a deficiency. A diet may contain enough vitamin C to prevent scurvy and yet not contain enough to prevent ill-health. This condition may be evidenced by a decrease in general body tone, lessened resistance to disease, irritability, lack of vitality, and loss of weight.

In scurvy, which follows from the use of a diet almost if not entirely lacking in vitamin C, the tissues have become depleted of vitamin C. In consequence there is failure in formation of the intercellular material, with resultant disorganization in tissue structure. There are many evidences of this, such as: (1) sore and bleeding gums; (2) teeth that crumble easily and are loose; (3) deterioration in bony structures, causing soreness and stiffness in joints and enlargement in the ends of

growing bone; (4) capillary hemorrhages in joints and muscle tissue; and (5) enlargement of the heart.

Storage in the body The body does not store vitamin C in excess of the amount needed to keep tissues saturated. A daily supply is needed.

Effect upon growth[23] Vitamin C made the difference in these guinea pigs of the same age.

A. This guinea pig had no vitamin C and developed scurvy. Note the rough fur and crouched position due to sore joints.

B. This guinea pig had plenty of vitamin C. It has sleek fur and is healthy and alert.

Food sources Vitamin C is the vitamin of fresh foods, since it is easily lost from foods during storage and cooking. The best sources of vitamin C are the citrus fruits—oranges, lemons, limes, and grapefruit (fresh or canned)—tomatoes, fresh or canned, raw cabbage, spinach, fresh or canned, and potatoes. Fresh orange juice is the antiscorbutic most commonly given to infants, but fresh or canned tomato juice may be used even with very young children.

Vitamin C occurs in varying amounts in most fresh fruits and vegetables and has been found in all fresh foods except ripe seeds. It does not occur to an appreciable extent, if at all, in dry cereals and legumes.

Raw milk contains varying quantities of vitamin C, depending partly

[23] These illustrations are taken from charts prepared in the Bureau of Home Economics, U. S. Department of Agriculture, Washington, D. C.

on the diet of the cow. In boiled, pasteurized, condensed, and evaporated milk the vitamin C originally present has been destroyed. The use of such milk in the feeding of infants will result in the development of infantile scurvy unless some fresh fruit or vegetable juice is added to the diet.

Stability in foods Vitamin C is very easily destroyed by oxidation; and, as with vitamin B, the rate of destruction increases with time and temperature. Fruits and vegetables lose much of their antiscorbutic potency during storage and when cooked or canned, depending on the temperature and length of time of cooking. Vitamin C is less easily destroyed in an acid medium, and naturally acid foods like tomatoes retain vitamin C when cooked or canned. Soda added to vegetables during cooking may increase the loss of vitamin C. Vitamin C is very soluble in water, and 30 to 40 per cent of the vitamin may be present in the cooking water when vegetables are boiled.

Commercially canned cabbage, spinach, apples, peaches, strawberries, and peas, which have been sealed before processing in the cans, lose only a little vitamin C, due largely to the fact that air is excluded during heating, thus preventing oxidation. Such canned foods are good sources of vitamin C if the necessary precautions are taken to preserve the vitamin after removing the foods from the can.

Dried fruits which have been subjected to fumes of sulphur dioxide during drying have been shown to retain practically all of their vitamin C, but dried fruits not so treated lose nearly all their antiscorbutic value.

Orange juice is highest in vitamin C content immediately after it is squeezed but will retain its value 24 hours or longer if kept in the refrigerator.

ASCORBIC ACID—IN AVERAGE SERVINGS*

EXCELLENT (VITAMIN C CONTENT 35 OR MORE MILLIGRAMS PER AVERAGE SERVING)

GRAMS	FOOD	AVERAGE SERVING	MGMS.
100	Asparagus, green	8 stalks, 4″ long	40
100	Beet greens	⅝ cup or 3 hp. tbsp.	45
100	Broccoli	¾ cup	125
100	Brussels sprouts	⅔ cup or 9 medium	95
50	Cabbage, young, partly green	¾ cup shredded or 2/3 cup cooked	30
50	Cabbage, bleached	⅔ cup shredded	30

* For further values, see Table 1, page 637.

ASCORBIC ACID—IN AVERAGE SERVINGS—Continued

EXCELLENT (VITAMIN C CONTENT 35 OR MORE MILLIGRAMS PER AVERAGE SERVING)

GRAMS	FOOD	AVERAGE SERVING	MGMS.
50	Cabbage, Chinese	¾ cup shredded	23
200	Cantaloupe	½, 5″ in diameter	60
100	Cauliflower	⅔ cup or ¾ cup cooked	75
100	Chard	3 ⅓ oz., or ¾ cup cooked	35
100	Collards	½ cup	60
100	Cowpeas, fresh	½ cup	35
100	Currant, black	1 cup scant	150
100	Currant, red	1 cup scant	45
100	Dandelion greens	½ cup cooked	36
100	Grapefruit	½ medium	43
100	Grapefruit juice, fresh	7 tbsp.	50
100	Grapefruit juice, canned	7 tbsp.	42
100	Kale	1 cup cooked	100
100	Kohlrabi	⅔ cup	60
100	Loganberries	½ cup scant	35
100	Mango, average	1 small	65
100	Mustard greens	½ cup cooked	120
100	Orange juice	½ cup scant	45
100	Papaya, ripe	¼, 5″ diameter	85
100	Pepper, green	1 medium	150
100	Pepper, red	1 medium	125
100	Persimmon, fresh, ripe	1 small	100
100	Rutabaga, yellow	¾ cup	45
100	Soybeans	½ cup	35
100	Spinach	1½ cups	50
100	Strawberry	½ cup, 12 medium	55
100	Tangerine	1 small	35

GOOD (VITAMIN C CONTENT 15-35 MILLIGRAMS PER AVERAGE SERVING)

GRAMS	FOOD	AVERAGE SERVING	MGMS.
100	Asparagus, bleached	8 stalks, 4″ long	30
100	Beans, snap, green	⅔ cup or ½ cup cooked	25
100	Beans, snap, wax	⅔ cup or ½ cup cooked	25
100	Beans, shelled, fresh, lima	⅝ cup or ½ cup cooked	30
100	Beans, shelled, fresh runner	⅔ cup or ½ cup cooked	25
100	Beet	2, 2″ in diameter or ½ cup diced	15
100	Endive	10 stalks	20
100	Escarole	4 leaves	15
90	Gooseberry	4 hp. tbsp.	23
100	Huckleberry	⅔ cup	30

ASCORBIC ACID—IN AVERAGE SERVINGS—Continued

GOOD (VITAMIN C CONTENT 15-35 MILLIGRAMS PER AVERAGE SERVING)

GRAMS	FOOD	AVERAGE SERVING	MGMS.
100	Leek	1 cup, ½″ pieces	30
50	Lemon juice	¼ cup	23
50	Lime juice	¼ cup	18
100	Okra	½ cup	30
100	Onion, mature	½ cup sliced or 3 medium	15
100	Parsnip	¾ cup, 1 large	22
100	Pea, green fresh	½ cup scant	25
100	Pineapple juice, fresh	½ cup scant	20
100	Pineapple	1 slice, ¾″ thick	15
100	Potato	1 medium	12
100	Raspberry	½ cup	20
100	Rhubarb	1 cup, 1″ pieces	15
100	Squash, summer	½ cup or 4 r. tbsp. cooked	20
100	Sweet potato	⅓ cup or 1 small	15
100	Tomato, mature, green	1 medium	22
100	Tomato, mature, red	1 medium	22
100	Tomato juice, fresh	½ cup	22
100	Tomato juice, canned	½ cup	18
100	Turnip, white	½ cup cubed	30
100	Turnip, yellow	½ cup cubed	30

FAIR (VITAMIN C CONTENT 5-15 MILLIGRAMS PER AVERAGE SERVING)

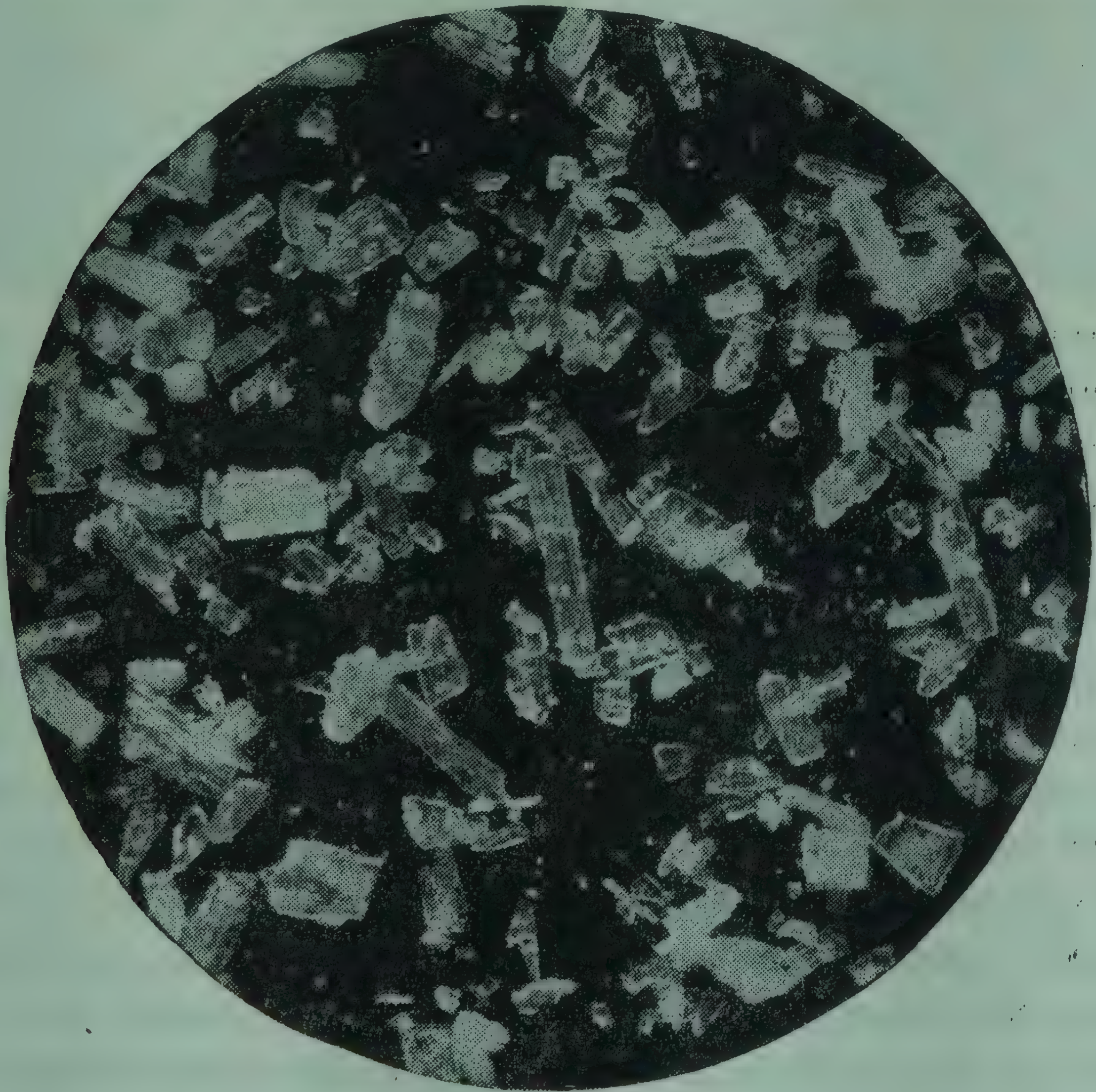
GRAMS	FOOD	AVERAGE SERVING	MGMS.
100	Apricot, fresh	3 medium	7
100	Artichoke, globe or French	2, 3″ in diameter	9
100	Avocado	½ small	12
100	Banana	1 medium	10
20	Onion, green shoots	4, 5″ long	6
100	Pineapple juice, canned	½ cup scant	10
30	Radish	5 medium, 1″ in diameter	6
25	Water cress	10 pieces	12

VITAMIN D—CALCIFEROL—For Good Bones and Teeth

Antirachitic—$C_{28}H_{43}OH$—Fat-soluble

Properties Vitamin D is associated with the cure and prevention of rickets, a disease of childhood characterized by defective growth of the bony structures. Vitamin D is unique in that it may be formed in the body. The skin contains a substance, provitamin D, that may be activated or changed into vitamin D under the influence of sunlight containing ultraviolet light.

Several forms of vitamin D have been isolated and identified. Two are of importance nutritionally: (1) natural vitamin D, or vitamin D_3, and (2) artificial vitamin D, also known as vitamin D_2, or Calciferol. Natural vitamin D (D_3) is the vitamin D of fish-liver oils and is the substance formed in the activation of 7-dehydrocholesterol, the provitamin D of cholesterol, the sterol of animal tissues. Artificial vitamin D (D_2) is obtained through the activation by ultraviolet light of a substance present in ergosterol, the sterol derived from plants and abun-



Crystals of vitamin D_2, magnified 15 times. (*Courtesy,* Distillation Products, Inc., Rochester, N. Y.)

dantly present in yeast. Vitamin D_3 seems to be somewhat more efficacious in the cure and prevention of rickets than vitamin D_2.

Function The function of vitamin D is to help in regulating the utilization of calcium and phosphorus in the body. These two elements are essential constituents of the substance that gives teeth and bones their rigidity and hardness. Thus vitamin D is very important in the formation of strong bones and sound teeth that will resist decay.

Effect of a deficiency An insufficient supply of this vitamin results in:

1. Defective calcification of bony tissue, with resultant rickets, a deficiency disease in which the bones fail to calcify normally. It is marked by deformities of the bones, wrists, legs, chest, and head. While vitamin D is important in the prevention and cure of rickets, it is not the only factor to be considered. The supply of calcium and phosphorus in the diet must also be adequate.
2. Defective calcification of teeth.
3. Retarded growth.
4. Lowered concentration of calcium or phosphorus or both in the blood.
5. Lowered acidity of the intestinal tract.

Storage in the body Vitamin D can be stored only to a slight extent in the body. The value of giving an abundant supply of this vitamin to the prospective and nursing mother can therefore hardly be overestimated. She must provide an ample quantity for the baby before birth and maintain a high antirachitic potency in her milk during the nursing period in order to lessen her baby's susceptibility to rickets. A plentiful supply of vitamin D will also tend to lessen the danger of damage to her own bones and teeth through a drain on her tissues to meet the needs of the child.

Effect upon growth[24] Vitamin D made the difference in the rats shown on page 61. They were 20 weeks, all from the same litter.

Food sources Very few natural foods contain vitamin D in any considerable amount. The richest sources of this vitamin are the fish-liver oils. No other natural source is able to compare with them. Cod-liver oil is a well-tried source and has the added advantage of

[24] These illustrations are taken from charts prepared in the Bureau of Home Economics, U. S. Department of Agriculture, Washington, D. C.

containing vitamin A as well. Egg yolk is a fair source, one yolk equaling about 0.3 gram of standard cod-liver oil.

Cow's milk is naturally low in vitamin D. Its content of the vitamin may be increased (1) by direct irradiation, (2) by adding a vitamin D concentrate, or (3) by enriching the cow's food with vitamin D. Milk is valuable in the treatment of rickets for its calcium content.

A. This rat had no vitamin D. Note the short body and bow-legs—typical signs of rickets.

B. This rat had plenty of vitamin D. Its bones are strong and straight.

Vitamin D can be produced in the body (1) by the action of ultraviolet rays obtained through exposure of the body to direct sunlight, (2) by the action of artificial sunlight, produced by the carbon arc lamp, and (3) by the ultraviolet rays of the mercury-vapor quartz lamp. The ultraviolet rays of natural sunlight are so easily filtered out by smoke, dust, or ordinary window glass that sunlight is not usually reliable as an antirachitic agent.

In general it may be said that all diets, especially of children, should be supplemented with some especially good source of this vitamin during the periods when clear bright sunshine is not easily available.

Artificial source Vitamin D can be produced in many foods by proper irradiation with ultraviolet rays. It is formed in the irradiation of ergosterol, of which yeast is a rich source.

An irradiated solution of ergosterol in oil, called viosterol, is available through the drug trade for therapeutic use on the advice of a physician. Unlike cod-liver oil, however, viosterol does not contain vitamin A and is not as effective a preventive of rickets as fish-liver oil.

Stability in foods Ordinary cooking temperatures do not affect vitamin D, nor is it dissolved in the cooking water.

VITAMIN D—IN AVERAGE SERVINGS †

GRAMS	FOOD	AVERAGE SERVING	INTERNATIONAL UNITS
10	Butter	1 square	12
100	Cream	½ cup	50
100	Eggs	2 average	100
32	Egg yolk	2 average	80
5	Fish-liver oil, cod	1 tsp.	750
	Foods enriched with Vitamin D by irradiation with ultraviolet light		*
100	Liver	3 slices, 2″ x 1″ x 1¼″	200
220	Milk, enriched with Vitamin D	1 glass	*
220	Milk, whole	1 glass	5
100	Oysters	7 medium	5
100	Salmon	½ cup	450
30	Sardines	4 small or 2 large	*

* Fair source.
† For further values, see Table 1, page 637.

ALPHA-TOCOPHEROL—VITAMIN E—Reproductive Vitamin

Antisterility—$C_{29}H_{50}O_2$—Fat-soluble

Properties In experiments with rats it was noticed that animals raised on a diet adequate in vitamins A and B_1 appeared to be healthy and active but bore no young. Through improvements made in the diet to overcome this defect, a specific fertility factor was recognized, which soon came to be known as vitamin E. Vitamin E has been identified chemically and prepared in form of its crystalline salts.

Function Several species of animals are known to require vitamin E for successful reproduction. Other vitamins are also essential for reproduction in relation to their property of maintaining the normal function of specific tissues. For most of these, the effects of a deficiency occur early in the reproductive process, and the picture is one of sterility. The function of vitamin E is more truly related to reproduction. In the

male a deficiency of vitamin E leads to deterioration of the germ cells, and prolonged low intake of the vitamin results in permanent sterility. In the female, ovulation and implantation take place and growth of the embryo begins, but after a period specific for the species growth ceases and resorption takes place.

Crystals of alpha-tocopherol palmitate, magnified 10 times. (*Courtesy,* Distillation Products, Inc., Rochester, N. Y.)

There is at present no clinical evidence that human beings require vitamin E for successful reproduction. Some evidence has accumulated that vitamin E is effective in the treatment of certain types of muscular dystrophy, but until more consistent results are obtained this can only be considered as speculative.

Sherman says, "Because of its wide distribution in foods and the improbability of its being a limiting factor in human nutrition, it seems unnecessary at least and quite possibly misleading to lay emphasis upon vitamin E in practical considerations of food values."[25]

Effect of a deficiency When female rats, fed on a diet lacking in vitamin E, are mated, they usually become pregnant but fail to bear young. Growth of the fetus ceases early in pregnancy, and resorption of both fetus and placenta occurs.

[25] *Op. cit.* By permission of the publishers.

Storage in the body Vitamin E can be stored for a relatively long period in the body tissues. It is also transferred from mother to offspring during intra-uterine life.

Food sources Vitamin E is widely distributed in foods. The oil of the wheat germ is its richest source, and it occurs abundantly in seeds and green leaves generally. It is also found in milk fat and in low concentration in animal tissues.

Stability in foods Vitamin E is not affected to any appreciable degree by heat. Its activity is rapidly destroyed, however, if fat or oil in which it is dissolved becomes rancid.

RIBOFLAVIN—For Growth and Well-being

$C_{17}H_{20}N_4O_6$—Water-soluble

Properties Yeast, a rich source of vitamin B_1, when heated at high temperature for 2 hours loses its antineuritic potency but still contains a substance essential for growth and well-being, as shown by experiments with rats. This substance has been isolated and identified chemically as riboflavin. Before its identification, riboflavin was called vitamin G, or, in relation to the vitamin B complex, Vitamin B_2.

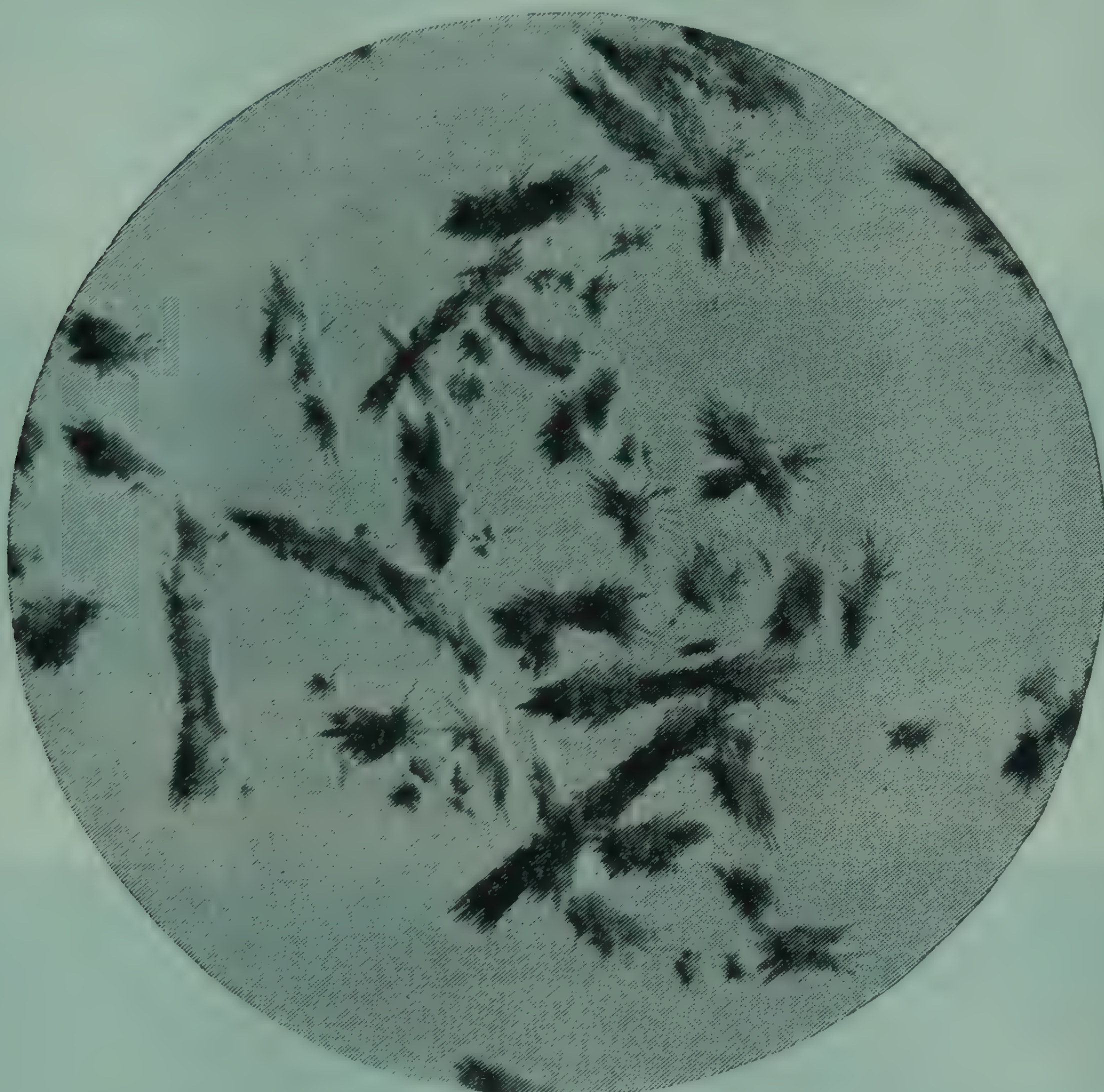
Riboflavin is a yellow green-fluorescent, water-soluble pigment occurring in a large number of foods of both plant and animal origin. In its natural form it is fairly resistant to destruction by heat but is affected by light.

Function The functions of riboflavin have been studied most extensively with laboratory animals. Rats deprived of riboflavin develop a dry skin and tend to lose their fur easily. Young rats deprived of riboflavin appear prematurely old. The eyes are especially affected. The lids become swollen and encrusted, and the fur is lost from the lids and over the area around the eyes. Changes also take place within the eyes, evidenced by an ingrowing of capillaries into the cornea from the periphery. Instances are reported of the development of cataracts following prolonged deficiency. A keratitis similar to that seen in the eyelids develops around the mouth and on the ears.

The function of riboflavin in human nutrition is not altogether clear. In general it appears to promote growth and maintain general well-being. A condition frequently ascribed to ariboflavinosis and known as *cheilosis* is characterized by a readily recognized type of erosion at the angles of the mouth.

It is known that riboflavin in conjunction with several other vitamins of the B complex functions in the complex chemical processes of cell respiration.

In discussing the functions of riboflavin, Sherman says, "Thus whether or not ariboflavinosis is an important disease, it is clear that riboflavin is an important factor in health, and in the building of already-normal health to higher levels.



Crystals of riboflavin. (*Courtesy,* Abbott Laboratories, North Chicago, Ill.)

"Riboflavin is essential to growth, and to normal nutrition at all ages. When the food is poor in riboflavin for any considerable length of time, digestive disturbances, nervous depression, general weakness and deterioration of tone, and poor conditions of the eyes and skin are apt to develop; the incidence of infectious disease is likely to be increased, vitality diminished, life shortened, and the prime of life seriously curtailed by the unduly early development of the physical manifestations of old age.[26]

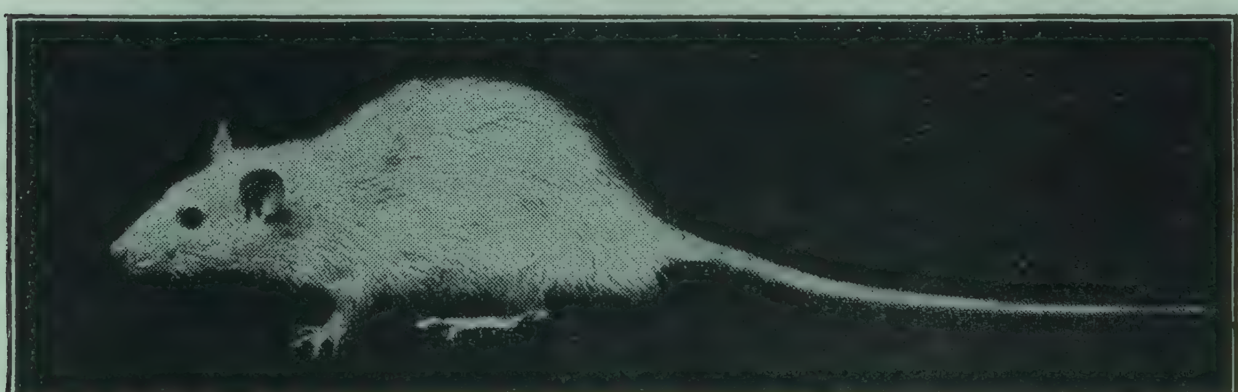
[26] *Op. cit.* By permission of the publishers.

Effects of a deficiency An inadequate supply of this vitamin in the diet of rats results in: (1) retarded growth, (2) loss of weight, (3) digestive disturbances, (4) dry skin and loss of fur, (5) swollen eyelids and encrustations around the mouth and on the ears, (6) proliferation of capillaries within the cornea and cataract formation in some cases, (7) increased susceptibility to infections, and (8) premature onset of the appearance of senility.

Storage in the body In rats deprived of riboflavin the signs characteristic of a deficiency appear relatively soon, indicating that body stores are probably not greatly in excess of immediate body needs.

Effect upon growth[27] Riboflavin made the difference in this male rat.

A. This rat had no riboflavin and when 28 weeks old weighed only 63 grams. Note loss of hair and emaciated condition.



B. The same rat 6 weeks later, after receiving food rich in riboflavin. Its weight was then 169 grams.

Food sources The richest known source of riboflavin is dried brewer's yeast. Liver is almost as rich, and kidney only slightly less. Egg yolk is a good source, being over twice as rich as the white. Milk is a valuable source. Sherman says, "Milk is normally the most important source of riboflavin in the dietary." A quart of milk will yield as much

[27] These illustrations are taken from charts prepared in the Bureau of Home Economics, U. S. Department of Agriculture, Washington, D. C.

riboflavin as 7 or 8 eggs, 2 ounces of liver, or 1½ pounds of lean beef, muscle meat being only about one-eighth as rich as liver. American cheese is about equal to egg yolk, and two-thirds of a pound of this cheese contains about as much as three quarts of milk.

Green leaves form the richest vegetable source of riboflavin, and fresh peas and lima beans are nearly as good. Dried lima beans are a good source, dried whole green peas being slightly better, and dried soybeans three times as rich.

Roots, tubers, and fruits are low in this vitamin. Cereals are among the poorest sources. In grains the vitamin is concentrated in the germ portion so that this substance by itself is a rich source.

Stability in foods Riboflavin is not easily destroyed by heat or oxidation. The addition of soda or other alkaline substances in cooking, however, hastens its destruction. Since riboflavin is water-soluble, it may dissolve in the cooking water, hence this water should be used and not discarded.

RIBOFLAVIN (VITAMIN G)—IN AVERAGE SERVINGS *

EXCELLENT (RIBOFLAVIN CONTENT MORE THAN 400 MICROGRAMS PER AVERAGE SERVING)

GRAMS	FOOD	AVERAGE SERVING	MCGMS.
100	Cheese, Camembert	3 1/3 oz.	650
100	Heart (beef, pork or lamb)	1 slice, 2" x 3" x 1" raw	900
100	Kale	½ cup, cooked	400
100	Kidney	½ cup cubed	2,100
100	Liver	3 slices, 2" x 1" x ¼"	3,000
100	Turnip greens	½ cup cooked	450

GOOD (RIBOFLAVIN CONTENT 400-250 MICROGRAMS PER AVERAGE SERVING)

GRAMS	FOOD	AVERAGE SERVING	MCGMS.
100	Beet greens	⅝ cup or 3 hp. tbsp. cooked	300
100	Collards	½ cup	300
100	Cowpeas, fresh	½ cup	300
100	Eggs, whole	2 average	350
220	Milk, whole, fresh, Pasteurized	1 glass	352
20	Milk, whole, dried	3 tbsp. scant	300
20	Milk, skim, dried	2½ tbsp.	320
100	Mustard greens	½ cup cooked	350
100	Spinach	1½ cup or ½ cup cooked	250
100	Tongue, beef	5 slices	270
100	Veal	1 medium chop, ⅜" thick	250

* For further values, see Table 1, page 637.

RIBOFLAVIN (VITAMIN G)—IN AVERAGE SERVINGS—Continued

FAIR (RIBOFLAVIN CONTENT 250-100 MICROGRAMS PER AVERAGE SERVING)

GRAMS	FOOD	AVERAGE SERVING	MCGMS.
100	Asparagus, green	8 stalks, 4″ long	120
100	Beans, snap, green	⅔ cup	110
100	Beans, snap, wax	⅔ cup	100
100	Beans, shelled, fresh, lima	½ cup or 4 r. tbsp.	150
30	Beans, shelled, dried, lima	3 tbsp.	225
30	Beans, shelled, dried, soybeans	3 tbsp.	225
100	Broccoli	¾ cup	240
100	Cauliflower	⅔ cup or ¾ cup cooked	125
100	Celery, green	4 medium stalks, or ¾ cup	100
100	Chard	3 1/3 oz. or ¾ cup cooked	125
20	Cheese, Cheddar	1″ cube	100
20	Cheese, Swiss	1 slice, thin	100
100	Chicken, light	½ breast, average	130
32	Eggs, yolk	2 yolks, average	156
100	Escarole	4 leaves	200
100	Okra	½ cup	100
100	Peas, green, fresh	½ cup scant	200
100	Prunes, dried	12, 50/60s	125
100	Salmon, Atlantic	1 piece, 4″ x 1½″ x 1″	140
100	Salmon, canned, Chum	½ cup flaked	100
100	Salmon, canned, red	½ cup flaked	170

NICOTINIC ACID, OR NIACIN—Prevents and Alleviates Symptoms of Pellagra

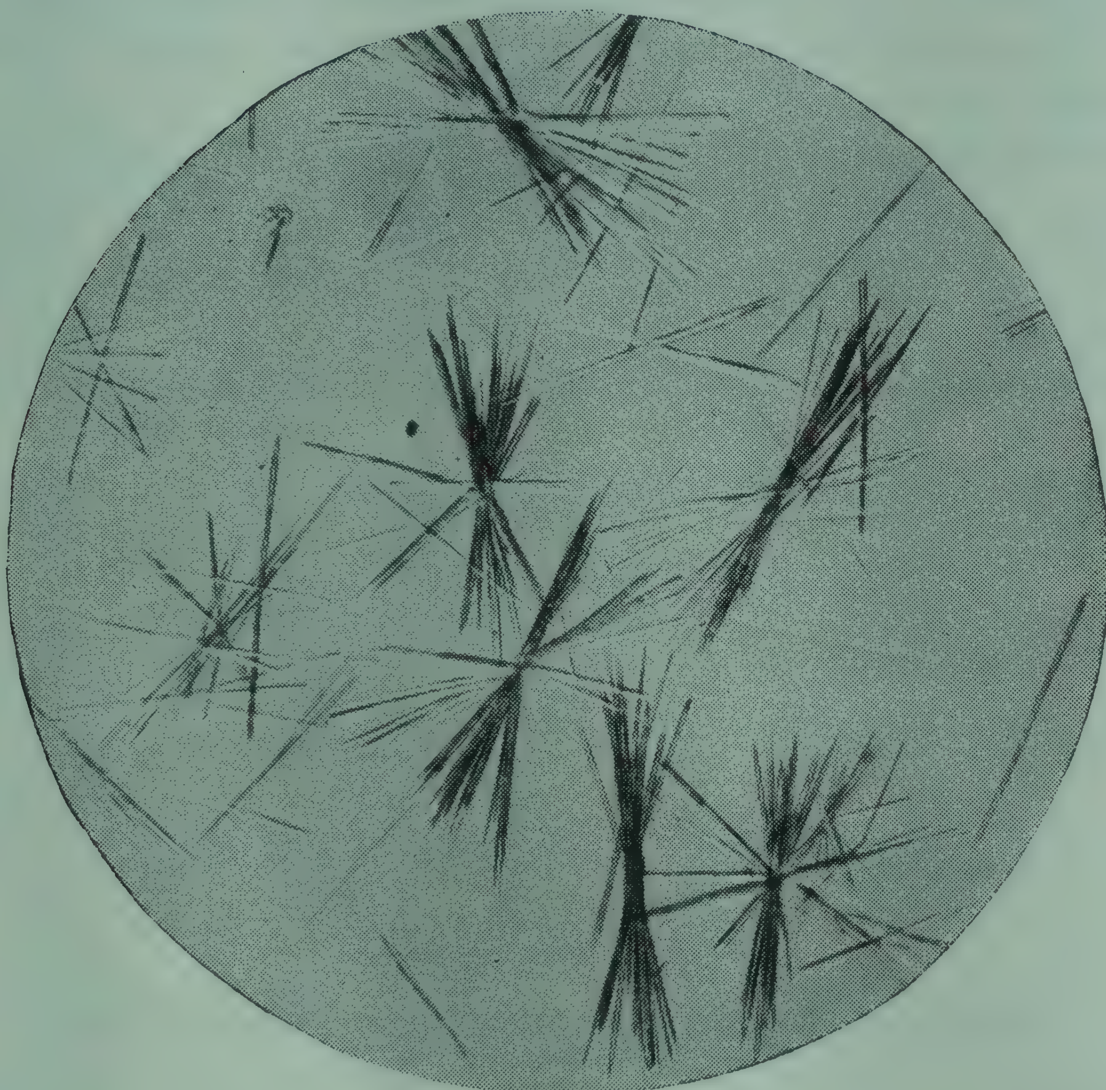
$C_6H_5NO_2$—Water-soluble

Properties Pellagra is a disease of common occurrence among people having a very low income, whose diet is accordingly restricted in the variety and quality of foods used. In the United States the disease is endemic in certain of the southern states, but is found in all areas where income is inadequate.

That the disease is of dietary origin was shown conclusively a number of years before the responsible substance was identified. It is now a well-established fact that nicotinic acid and nicotinamide will alleviate and prevent the most marked symptoms of pellagra. There are indications

that the pellagra syndrome may be the result of a multiple deficiency, and the use of the term "antipellagra vitamin" for nicotinic acid has not been given unqualified endorsement.

Nicotinic acid as a chemical in pure form was available long before its therapeutic value was recognized. It is a white crystalline material readily soluble in water and fairly resistant to destruction by heat.



Crystals of nicotinic acid (niacin). (*Courtesy,* Abbott Laboratories, North Chicago, Ill.)

Functions The functions of nicotinic acid have been studied almost entirely through its action in the cure of black-tongue in dogs and pellagra in man. The early symptoms of pellagra are loss of appetite, loss of weight, and general weakness. As the disease progresses, the tongue becomes fiery red, and the mucous membranes of the mouth and entire digestive tract are inflamed. Diarrhea and vomiting are common. One of the most characteristic symptoms is the symmetrical skin lesions on the backs of the hands and the tops of the feet. Similar lesions may appear around the neck, often referred to as the "collar" or "neck-

lace." Cutaneous symptoms are aggravated by exposure to sunlight, supporting the idea of seasonal incidence of the disease. Nervous symptoms are frequently observed and may vary from irritability or anxiety to acute mania.

It is now known that nicotinic acid, like other members of the vitamin B complex, functions in cell respiration or oxidation.

Administration of nicotinic acid to pellagra patients brings about rapid improvement in subjective symptoms and a gradual healing of the external and internal lesions.

Effect of a deficiency The long-continued use of a dietary supplying inadequate amounts of nicotinic acid results in: (1) loss of appetite, (2) loss of weight, (3) general weakness, (4) red and sore tongue, (5) inflammation of the mucous membranes of the digestic tract, (6) lesions on the hands and feet, and (7) lesions of the lips and around the neck.

Storage in the body Nicotinic acid is not stored in the body in the sense in which storage of vitamin A takes place in the liver. It is present in practically all tissues of the body, and the relatively long time required for depletion to the point of appearance of symptoms of pellagra implies a conservation of this tissue supply.

NICOTINIC ACID—IN AVERAGE SERVINGS *

RELATIVE VALUES

EXCELLENT (NICOTINIC ACID CONTENT 6000 MCGMS. OR OVER)

GRAMS	FOOD	AVERAGE SERVING	MCGMS.
100	Chicken	½ breast, average	10,000
100	Halibut	1 piece, 4½" x 1½" x 1"	6,000
100	Heart, beef	1 slice, 2" x 3" x 1"	6,000
100	———, lamb	1, 4" long	6,000
100	———, pork	½ medium	6,000
100	Kidney, beef or veal	2 or ½ cup cubed	6,500
100	———, lamb	1 whole	6,500
100	———, pork	¼ lb. or 1 piece, 4" x 2" x ⅞"	6,500
100	Liver (average)	3" x 6" x ½" (¼ lb.)	18,000
100	Salmon, Atlantic	1 piece, 4" x 1½" x 1"	6,500
100	Salmon, canned, chum	½ cup flaked	6,000
100	Tongue, beef	¼ lb. or 5 slices	9,000
100	Veal	1 medium chop	6,300

* For further values, see Table 1, page 637.

NICOTINIC ACID—IN AVERAGE SERVINGS—Continued

GOOD (NICOTINIC ACID CONTENT 6000-2000 MCGMS.)

GRAMS	FOOD	AVERAGE SERVING	MCGMS.
100	Beans, fresh, soybean	½ cup	2,000
100	Beef, muscle	1 slice, 2½" x 2½" x 1"	4,500
100	Chicken, dark	1 leg, meat only	5,000
100	Cod-fish, fresh	1 piece, 4" x 1½" x 1"	2,000
100	Ham, smoked, lean	1 piece, 4½" x 4" x ⅛"	5,562
100	Herring, Atlantic	1 small	(5,000)
100	Lamb, muscle, lean	2 slices, 4½" x 2" x ⅛"	5,000
100	Mackerel, Spanish	1 piece, 4" x 1½" x 1"	5,500
100	Peach, yellow, dried	6 halves	5,000
100	Pork, muscle, lean	1 large chop	5,000
30	Peanuts, Virginia type	¾ cup, shelled, 15 nuts	4,860
50	Sardine, canned	6 sardines, small	2,600

FAIR (NICOTINIC ACID CONTENT 2000-600 MCGMS.)

GRAMS	FOOD	AVERAGE SERVING	MCGMS.
30	Beans, shelled, dried red kidney	3 tbsp.	600
30	Beans, shelled, dried, soybean	1 slice, 3" x 3½" x ½"	840
30	Bread, whole wheat, 6% milk solids	6 pitted	800
40	Date, fresh or cured	2½ tbsp.	900
30	Lentils	3 tbsp.	840
30	Pea, green, dried	2 tbsp. or ¾ cup cooked	800
20	Rice, brown	3 tbsp.	750

Food sources Several methods have been proposed and are in use for the quantitative determination of nicotinic acid in foods. Values reported are, however, somewhat contradictory; and until more work is done toward selecting a reliable method there should not be too much concern over values for foods that apparently contain relatively small amounts.

Foods tested and known to be effective in reasonable amounts for the prevention of pellagra are lean meat and some glandular organs, leafy green vegetables, milk, eggs, and legumes.

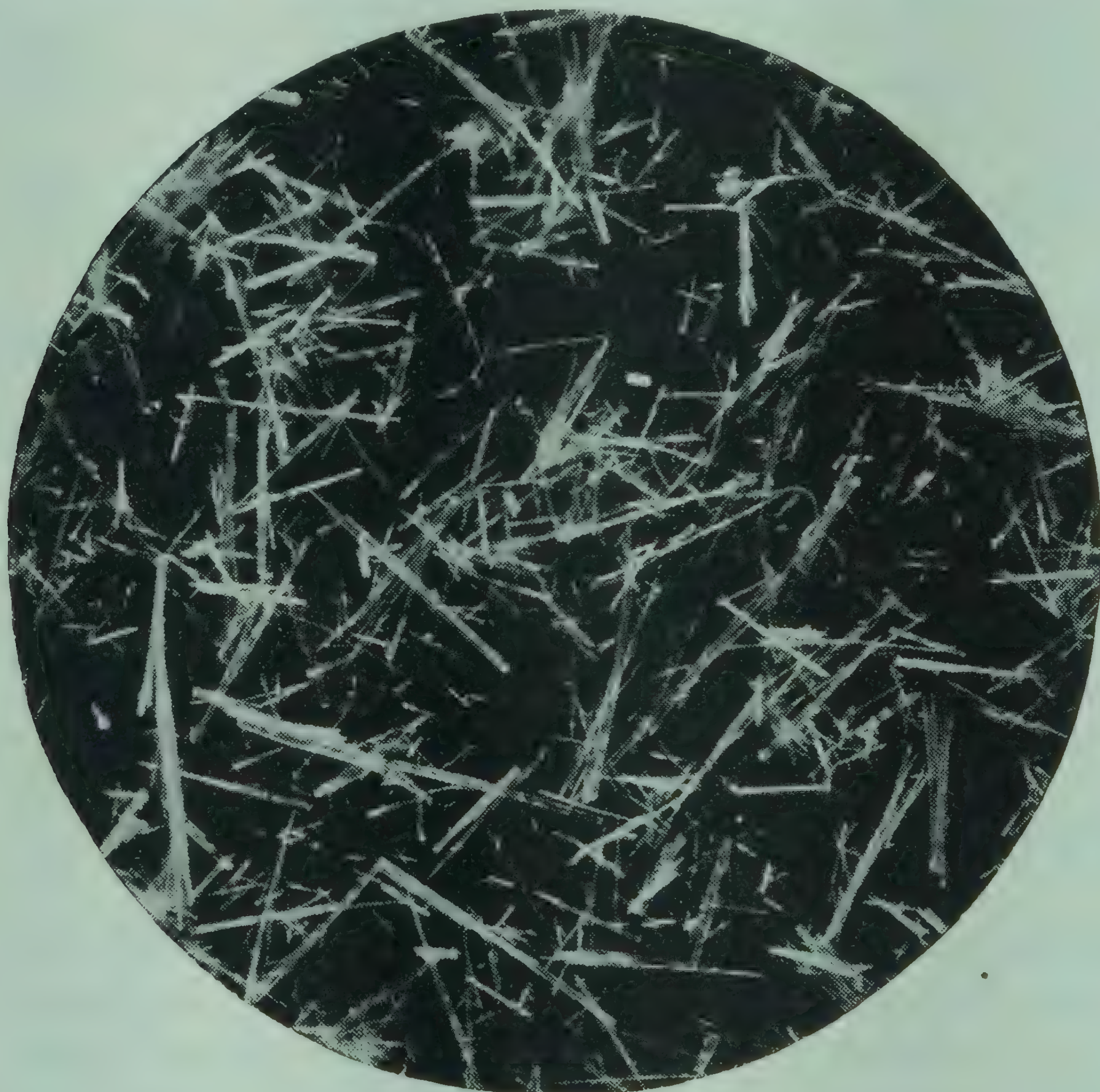
Stability in foods Nicotinic acid is relatively resistant to destruction by heat. The pure substance is soluble in water, but in foods nicotinic acid is in complex combination and is not easily removed by solution

VITAMIN K—Antihemorrhagic

$C_{31}H_{46}O_2$—Fat-soluble

Properties Vitamin K was discovered through the effect of a deficient diet on chickens. Young chicks maintained on artificial diets containing all of the vitamins known to be essential for growth and well-being did not thrive and were observed to be subject to subcutaneous and intramuscular hemorrhages. The blood of such chicks showed an abnormally long clotting time. Evidence was soon obtained that this defect was due to failure to supply a constituent present in certain foods such as alfalfa-leaf meal and other green leafy material.

Vitamin K is a yellow crystalline material, soluble in fats.



Crystals of vitamin K, magnified 15 times. (*Courtesy,* Distillation Products, Inc., Rochester, N. Y.)

In the natural state, two forms of vitamin K are known—vitamin K_1, separated from alfalfa-leaf meal, and vitamin K_2, first separated from putrefied sardine meal. Many synthetic products with antihemorrhagic properties similar to vitamin K have also been prepared.

Function Vitamin K is specific in its properties and acts to maintain a normal level of prothrombin in the blood. The presence of bile salts is essential to the absorption of vitamin K from the digestive tract. Thus an individual in whom the flow of bile is obstructed for any reason may show evidences of vitamin K deficiency, even though his diet contained an adequate supply.

Effect of a deficiency When the diet does not contain an adequate supply of vitamin K, or failure of the secretion of bile prevents its absorption from the digestive tract, the result is (1) increase in the clotting time of the blood and (2) subcutaneous and intramuscular hemorrhages.

Food sources "Vitamin K is distributed widely in nature, and among its richest sources are green leaves of different kinds. Alfalfa and spinach are rich in the vitamin; and cabbage, cauliflower, carrot tops, soybean oil and seaweed are all good sources. Less abundant sources are tomatoes, orange peel and hemp seed. Seeds, fruits and roots in general contain considerably less vitamin K than do green leaves of different kinds. Parts of the plant that contain chlorophyll usually have the largest amount of vitamin K. The vitamin also is found in a number of bacteria, and during growth of bacteria the vitamin apparently is synthesized and retained.[28]

Stability in foods Vitamin K in its natural form is not easily destroyed by heat. Like several of the other vitamins, it is more readily destroyed in an alkaline medium.

VITAMIN K IN AVERAGE SERVINGS[29]

GRAMS	FOOD	MICRO-GRAMS *	GRAMS	FOOD	MICRO-GRAMS *
100	Calavo	8	100	Strawberries	6
100	Spinach	176	25	Oats	9.1
100	Tomatoes, ripe	12	30	Cornmeal	5.3
57	Cabbage, inner leaves	18	100	Carrots	5.3
100	Cauliflower, flower	23	120	Potatoes	10.7

* In terms of 2-methyl-1, 4-naphthoquinone.

[28] *Handbook of Nutrition,* Chicago: the American Medical Association, 1943. See also Hugh R. Butt and A. M. Snell, *Vitamin K,* Philadelphia: W. B. Saunders Company, 1941.

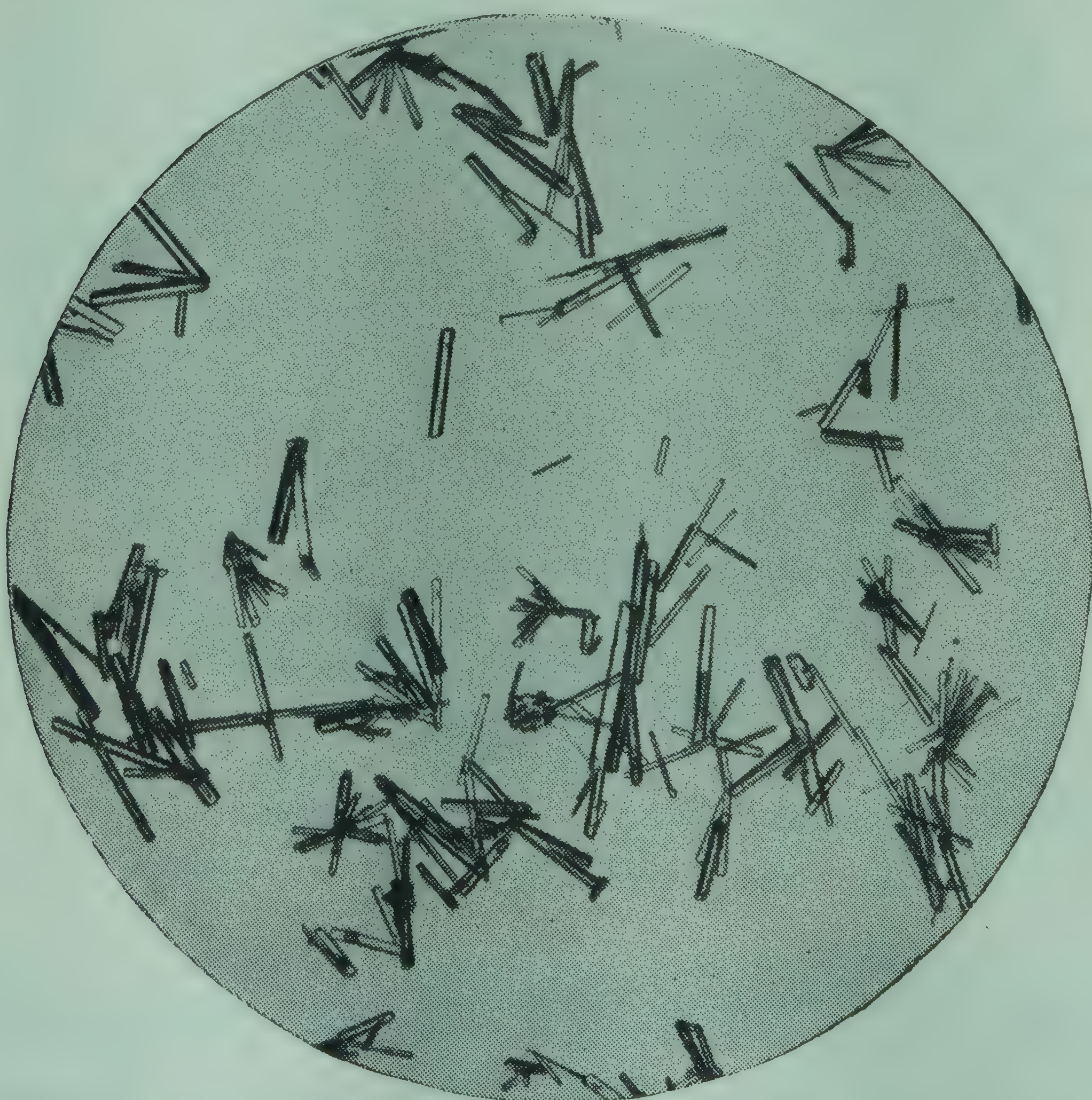
[29] S. Lassen, K. Bacon, and J. Sutherland, in *Journal of the American Dietetic Association,* 20 (December 1944), 761.

OTHER VITAMINS OF INTEREST

The eight vitamins discussed, with the possible exception of vitamin E, are those generally accepted on the basis of clinical evidence as essential in the diet of man. Experiments with several species of animal have shown the presence in foods of many other substances that may properly be classified as vitamins. Many of these are being actively investigated, and undoubtedly a number of them will be found to be essential to man. Several are of particular interest in this respect from the universal nature of their role in cell activities.

PYRIDOXINE (vitamin B_6)

With the identification of the heat-stable component of the vitamin B complex as riboflavin, it was found that rats given a synthetic diet containing the fat-soluble vitamins, thiamine and riboflavin, failed to grow and developed a dermatitis (acrodynia) on the paws, ears, and tip of the nose. The substance in yeast and wheat germ that prevented or



Crystals of pyridoxine hydrochloride (vitamin B_6). (*Courtesy,* Abbott Laboratories, North Chicago, Ill.)

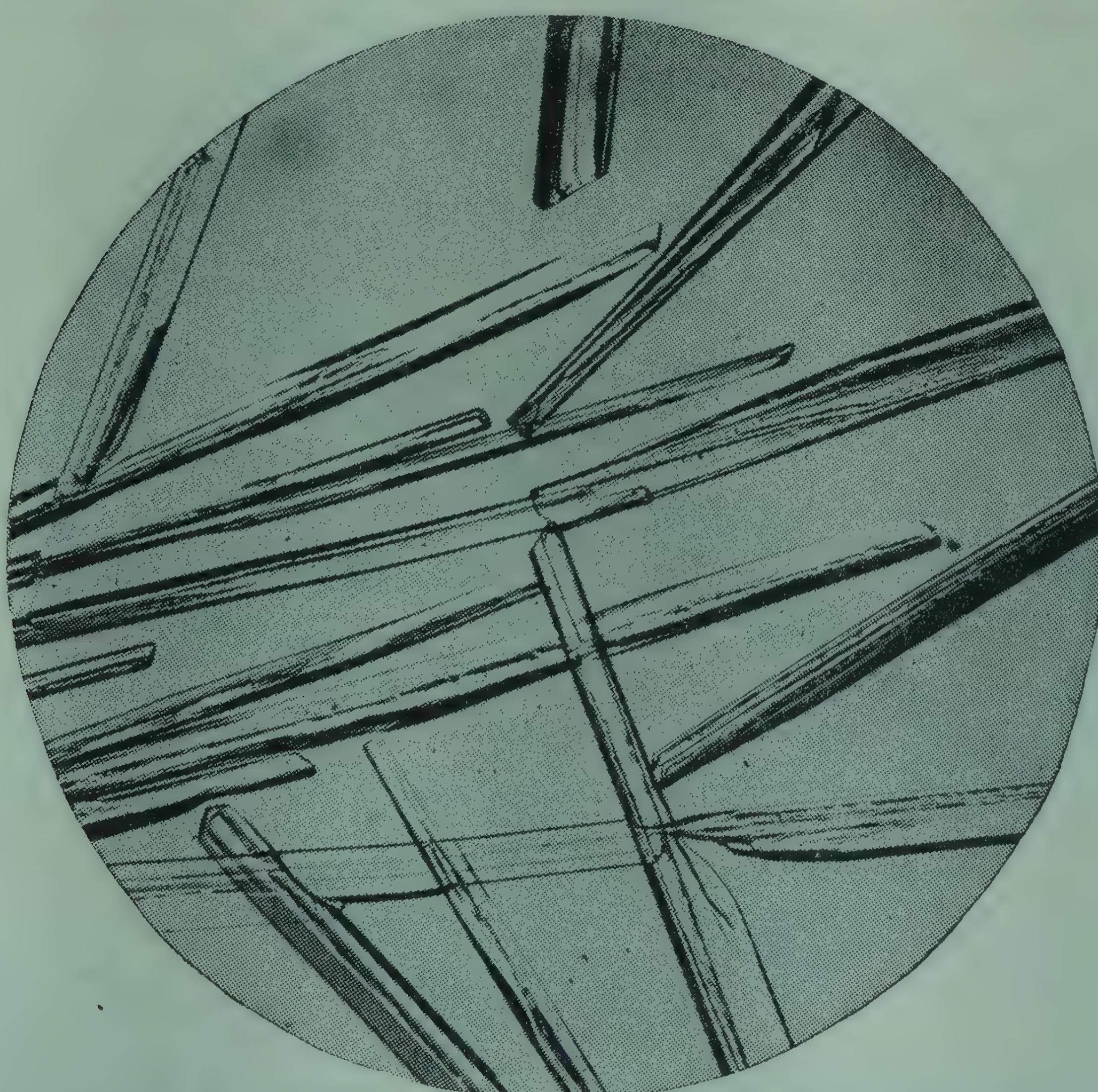
cured this condition was termed vitamin B_6. Later, when the substance had been isolated and chemically identified, it was given the name pyridoxine. The similarity in the chemical structure of pyridoxine with other vitamins of the B complex indicates that it probably functions in the respiration of cells.

Pyridoxine is a white crystalline substance soluble in water and relatively stable to heat. It may be destroyed by prolonged exposure to ultraviolet light.

The occurrence of pyridoxine in foods has not been studied extensively, but the few data available show a distribution somewhat different from that generally associated with vitamin value. Seeds, legumes, and cereals are relatively rich. Fruits and vegetables contain it, but are poor sources. The amounts in milk, eggs, and liver are small, and meats contain only fair amounts.

CHOLINE

The identification of choline as an essential nutrient may be said to have been made in reverse, since its chemical nature and presence in



Crystals of choline chloride. (*Courtesy,* Abbott Laboratories, North Chicago, Ill.)

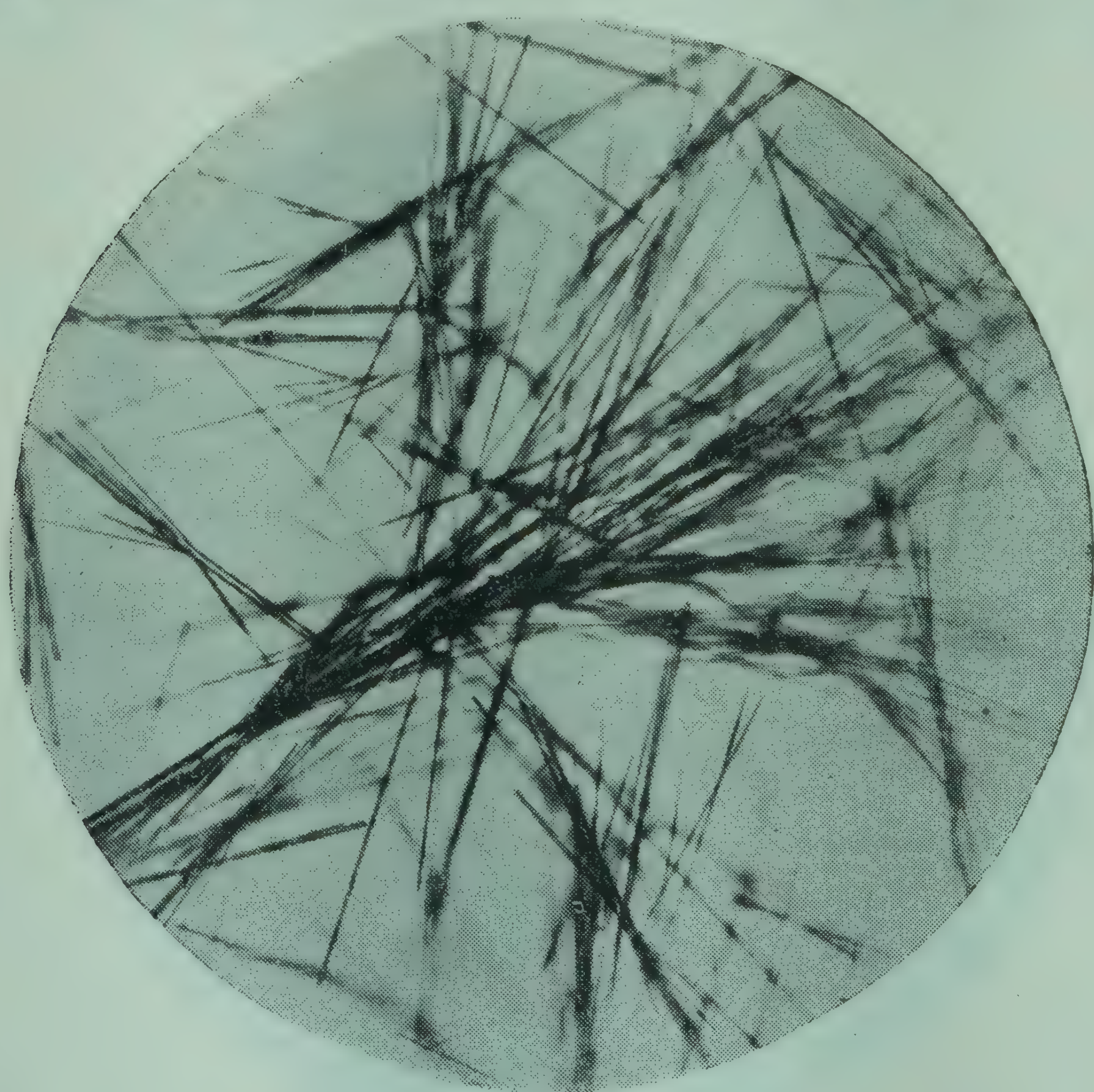
lecithin was known long before its essential function became apparent.

Dogs maintained on a low choline diet show abnormally large deposits of fat in the liver and to a degree in other tissues. This lipotropic action of choline seems to be one of its more obvious functions, as later investigations indicate that it may have other roles. The molecule of choline contains three unsubstituted methyl groups, and it has been shown that it may serve as a methylating agent within cells, giving rise to the concept of a methyl transfer system in cellular processes.

Foods containing lecithin, such as eggs, meat, vegetables, and cereals, also supply choline.

BIOTIN

Biotin has been recognized for a long time as an essential growth substance for microorganisms. For an approximately comparable length of time it has been known that a specific type of dermatitis developed in rats given a diet containing a high proportion of raw egg white. If the egg white was heated sufficiently, this effect did not result.



Crystals of biotin, magnified 100 times. (*Courtesy,* Vincent du Vigneaud, Cornell University Medical College.)

Investigations carried on over a period of years have shown that raw egg white contains two substances whose properties furnish a basis for an explanation of these effects. One substance, called vitamin H, prevents the onset of the dermatitis and cures the disease once it has developed. Relatively recently it was shown that this vitamin H is in all probability identical with biotin.

The second substance, now known as avidin, combines with vitamin H, or biotin, in such a way as to inhibit its action in preventing the dermatitis. In raw egg white there is sufficient avidin to inactivate all of the biotin present. Avidin is inactivated by heat, and its inhibiting property is absent from cooked egg white.

Biotin has been identified chemically and is available in pure form. In foods it is present in largest amounts in liver and kidney. Glandular meats, muscle meats, egg yolk, milk, some vegetables, and yeast also contain it.

The results of experimentally produced deficiency have been observed in man, and the nature of its functions are being actively investigated.

FOLIC ACID

Folic acid was so named because of its high concentration in green leaves. This substance as the "eluate factor" derived from extracts of liver was identified as a growth factor for certain bacteria.

Early in 1940 it was reported that chicks maintained on purified rations developed a specific type of anemia that could not be cured or prevented by any of the known vitamins, but which could be prevented by the addition of certain foods, yeast and liver, to the diet. The preventive factor was termed the "chick antianemic factor," or vitamin B_c, in consideration of sources and similarity in properties to other members of the B complex. Evidence is now at hand indicating that folic acid and the chick antianemic factor, or vitamin B_c, are identical.

The essential sources of folic acid are liver and muscle meats, green leaves such as spinach, tomatoes, and some fruits.

QUESTIONS FOR STUDY

1. What are vitamins?
2. How many are known? Name them.
3. Which are water-soluble and which fat-soluble?
4. How are vitamins measured?

5. Give the optimum daily allowance of each vitamin in International units.
6. Which vitamins have been isolated chemically?
7. What is carotene and what relation does it bear to vitamin A?
8. Name the chief functions of vitamin A. Vitamin B_1. Vitamin C. Vitamine D. Riboflavin (Vitamin G).
9. Can vitamin A be stored in the body? Vitamin B_1? Vitamin C? Vitamin D? Riboflavin (Vitamin G)?
10. What is the effect of a deficiency of vitamin A? Vitamin B_1? Vitamin C? Vitamin D? Riboflavin (Vitamin G)?
11. Name some sources of vitamin A. Vitamin B_1. Vitamin C. Vitamin D. Riboflavin (Vitamin G).
12. Discuss stability of vitamin A in food. Vitamin B_1. Vitamin C. Vitamin D. Riboflavin (Vitamin G).
13. What is nicotinic acid? Discuss its relation to pellagra.

2.
ENERGY METABOLISM AND THE ENERGY VALUE OF FOOD

If the science of nutrition may be likened to an edifice, its foundations may be said to lie in the development of the knowledge of energy metabolism and the body's utilization of food as sources of energy. Today such terms as "respiration," "oxidation," "combustion," and "energy metabolism" are commonplaces of the language. It is difficult to realize that once they did not exist because the processes they describe were unknown.[1]

Definition of energy Energy is defined as the ability to do work or to move an object against a force. This ability may be latent—that is, available but inactive. Coal, for instance, is a source of latent energy. Its energy becomes active through burning, or combustion, of the coal when its carbon combines with oxygen—in other words, oxidation.

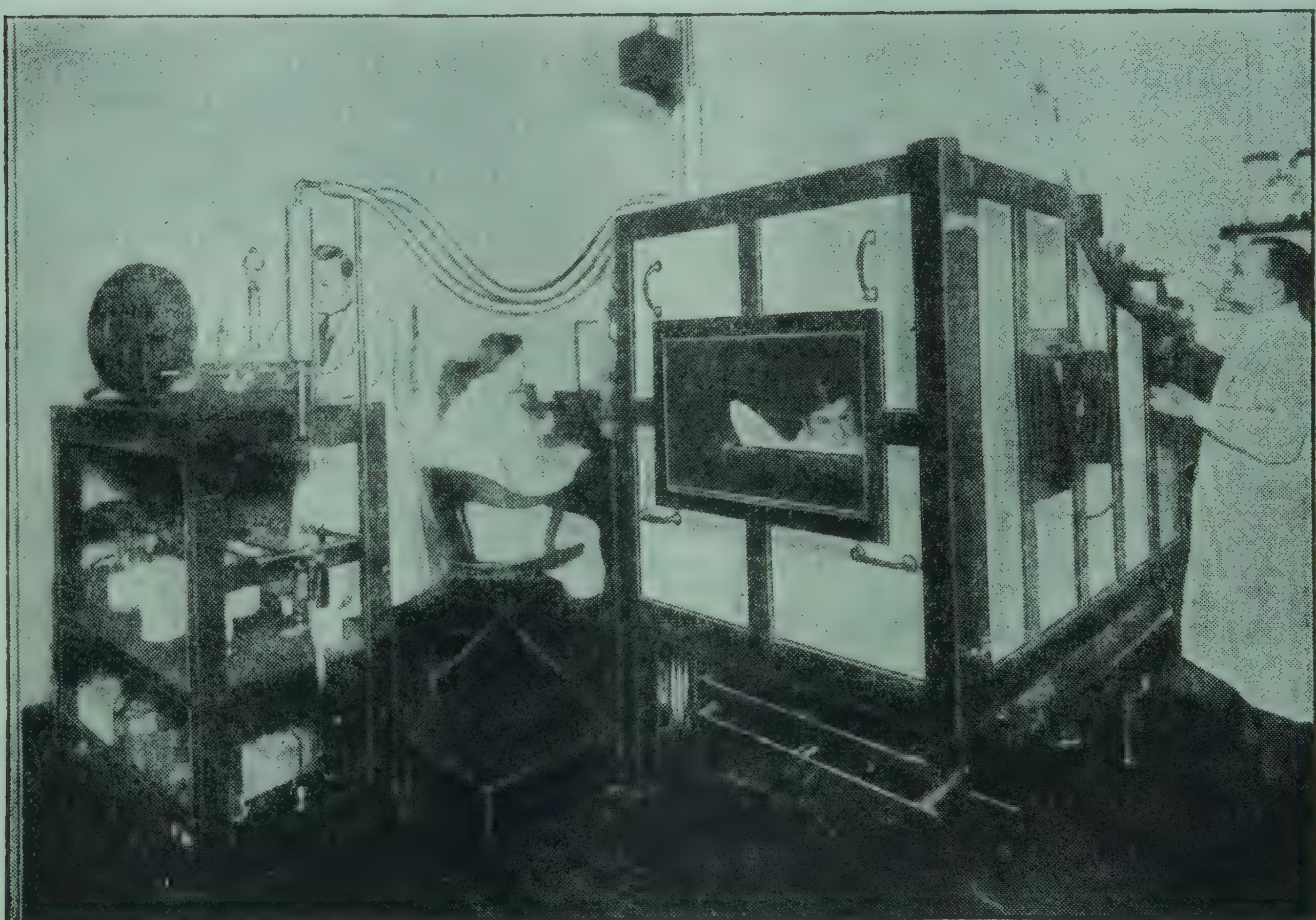
Energy may manifest itself in any one of several forms: as chemical energy, electrical energy, mechanical energy, heat energy. One form of energy may be changed into another form; and, according to the law of conservation of energy, no energy is lost or gained in the transfer.

Measurement of energy The principle of conservation of energy is made the basis of measurement of energy. The most common procedure is to convert other forms of energy into heat energy, which is then measured. This process is known as *calorimetry,* and the unit of measure is the calorie, which is the amount of heat energy required to raise the temperature of 1 gram of water 1° centigrade. Since this is a very small unit, the one generally used in nutrition is the large calorie (abbreviated C.), or the heat energy needed to raise the temperature of 1 kilogram of water 1° centigrade.

Energy expenditure of the body The body is constantly expending energy through the external work it does and in its internal processes

[1] An interesting historical resume of the development of this knowledge is found in G. MacLeod and C. M. Taylor, *Rose's Foundations of Nutrition,* 4th ed., New York: The Macmillan Company, 1944.

of digestion, circulation, respiration, and all cell activities. Food is the source of this energy, just as coal or gasoline provides the source of energy in an engine. The energy provided by food comes originally from the sun and, stored as chemical energy in plants, is made available to men and animals. Early in the nineteenth century Liebig showed that the substances burned, or oxidized, in the body to give energy are organic compounds of three types: carbohydrates, fats, and proteins. The principal products of such oxidation, or combustion, are carbon dioxide and water.



The respiration calorimeter of the Russell Sage Institute of Pathology. (From DuBois, *Basal Metabolism in Health and Disease,* Philadelphia, 1927.)

Measurement of energy expenditure The measurement of the energy expenditure of the body furnishes a basis for determining energy needs of the body. Two methods have been evolved for this purpose—the direct method and the indirect. The *direct method,* the more fundamental of the two, involves the use of the respiration calorimeter, an apparatus comprised of an insulated air-tight chamber arranged so that a supply of oxygen is provided from a closed circuit, making it possible to measure the oxygen used in respiration, or combustion, as

Motor-graphic type of portable respiration apparatus, showing subject during a test. (*Courtesy,* Sanborn Co., Cambridge, Mass.)

well as the carbon dioxide given off by the subject in the chamber. The energy expenditure is measured as heat which is transferred to a water circuit surrounding the chamber. The fundamental facts regarding energy metabolism have been obtained from experiments with the respiration calorimeter.

The *indirect method* of calorimetry is based on the demonstration, by means of the respiration calorimeter, that the energy expenditure in any given period, measured as heat energy, is equal to the energy calculated on the basis of the oxygen consumed and the carbon dioxide given off. The portable respiration apparatus depends upon the principle that the oxygen consumed by a subject is the measure of the amount of combustion or energy expenditure which is taking place in his body.

Basal energy metabolism As early as the midnineteenth century it was demonstrated that for all animals including man there is a typical minimum energy metabolism characteristic of the species in respect to size, age, and sex. This basal energy metabolism is apparent when no food is given. It represents the work being done by the heart, lungs, and other muscles and organs while the body is in the normal resting state.

The basal metabolism of normal individuals varies with age, sex, weight, shape, and body composition. In certain disease conditions it is increased; for instance, in cases of fever and exophthalmic goiter. In others, such as prolonged malnutrition and hyperthyroidism, it is lowered. Most diseases have little or no effect upon it.

Infants and children have a considerably higher basal metabolic rate per unit of weight than do adults—a fact accounted for by the factor of growth and relatively greater internal activity. In adults the rate gradually decreases and in old age shows a definite decrease.

For a healthy man of average weight, 154 pounds, or 70 kilograms, the basal energy metabolism represents 1600 to 1800 calories per day. For a woman weighing 123 pounds, or 56 kilograms, it is less—1300 to 1450 calories. This difference between men and women is caused by difference in size and body composition.

Total energy expenditure Basal energy metabolism represents the minimum of energy expenditure for the continuance of life. No one could survive for any length of time, however, at this rate of energy expenditure. Food must be taken and bodily activities assumed, both of which increase energy metabolism.

BASAL METABOLISM OF ADULTS AT DIFFERENT AGES [2]

AGE	CALORIES PER SQ. M.* PER HOUR		AGE	CALORIES PER SQ. M. PER DAY	
Years	*Men*	*Women*	*Years*	*Men*	*Women*
20-30	39.5	34.4	20-30	948	826
30-40	39.5	33.9	30-40	948	814
40-50	38.5	33.5	40-50	924	804
50-60	37.5	32.5	50-60	900	780
60-70	36.5	31.6	60-70	876	758
70-80	35.5	30.7	70-80	852	737

* Sq. M. = Square meter of body surface.

BASAL ENERGY METABOLISM OF CHILDREN FROM BIRTH TO 18 YEARS [2]

AGE	CALORIES PER SQUARE METER PER HOUR			CALORIES PER SQUARE METER PER HOUR	
	Boys	*Girls*	*Age*	*Boys*	*Girls*
Premature infants	25	25	6 years	44-53	41-50
Birth to 2 weeks	26-29	26-29	7 years	43-53	40-52
3 months	39	36	8 years	42-52	40-47
6 months	43	41	9 years	42-50	40-46
9 months	47	46			
			10 years	41-48	37-46
12 months	48	46	11 years	39-48	38-45
15 months	48	46	12 years	39-51	38-44
18 months	48	46	13 years	39-49	37-43
21 months	48	46			
			14 years	38-46	37-43
2 years	48-54	45-53	15 years	41-46	31-43
3 years	47-53	43-51	16 years	41-45	31-40
4 years	46-52	41-50	17 years	41-44	31-40
5 years	45-51	42-49	18 years	41-43	32-38

Effect of food on energy metabolism Lavoisier, the great French chemist, showed that the taking of food increased energy metabolism. This increase, known as the *specific dynamic action* of food, varies according to the type of food eaten, being less for carbohydrate and fat than for protein. For the usual mixed diet it has been calculated as approximately 6 per cent of the total caloric value of the food taken.

Energy for external work The most variable part of the total energy expenditure is that from muscular activity in doing external work. A man who expends 100 calories per hour when at rest may, by hard

[2] MacLeod and Taylor, *op. cit.* By permission of the publishers.

physical work, raise his energy expenditure to 500 or 600 calories per hour. Children are usually more active than adults; and hence in proportion to their age show a higher energy expenditure. Aged and sedentary individuals, on the other hand, have a considerably lower rate.

THE ENERGY COST OF ACTIVITIES[3]

(EXCLUSIVE OF BASAL METABOLISM AND INFLUENCE OF FOOD)

ACTIVITY	CAL. PER KG. PER HR.	ACTIVITY	CAL. PER KG. PER. HR.
Bicycling (century run)	7.6	Piano playing (Beethoven's Appassionata)	1.4
Bicycling (moderate speed)	2.5	Piano playing (Liszt's Tarantella)	2.0
Bookbinding	0.8	Reading aloud	0.4
Boxing	11.4	Rowing in race	16.0
Carpentry (heavy)	2.3	Running	7.0
Cello playing	1.3	Sawing wood	5.7
Crocheting	0.4	Sewing, hand	0.4
Dancing, foxtrot	3.8	Sewing, foot driven machine	0.6
Dancing, waltz	3.0	Sewing, motor driven machine	0.4
Dishwashing	1.0	Shoemaking	1.0
Dressing and undressing	0.7	Singing in loud voice	0.8
Driving automobile	0.9	Sitting quietly	0.4
Eating	0.4	Skating	3.5
Exercise		Standing at attention	0.6
Very light	0.9	Standing relaxed	0.5
Light	1.4	Stone masonry	4.7
Moderate	3.1	Sweeping with broom, bare floor	1.4
Severe	5.4	Sweeping with carpet sweeper	1.6
Very severe	7.6	Sweeping with vacuum sweeper	2.7
Fencing	7.3	Swimming (2 mi. per hr.)	7.9
Horseback riding, walk	1.4	Tailoring	0.9
Horseback riding, trot	4.3	Typewriting rapidly	1.0
Horseback riding, gallop	6.7	Violin playing	0.6
Ironing (5 lb. iron)	1.0	Walking (3 mi. per hr.)	2.0
Knitting sweater	0.7	Walking rapidly (4 mi. per hr.)	3.4
Laundry, light	1.3	Walking at high speed (5.3 mi. per hr.)	8.3
Lying still, awake	0.1	Walking down stairs	[a]
Organ playing (1/3 hand work)	1.5	Walking up stairs	[b]
Painting furniture	1.5	Washing floors	1.2
Paring potatoes	0.6	Writing	0.4
Playing ping pong	4.4		
Piano playing (Mendelssohn's Songs)	0.8		

[a] Allow 0.012 cal. per kg. for an ordinary staircase with 15 steps, without regard to time.
[b] Allow 0.036 cal. per kg. for an ordinary staircase of 15 steps, without regard to time.

[3] MacLeod and Taylor, *op. cit.* By permission of the publishers.

Calculating total energy expenditure It should be apparent that total energy expenditure is the sum of (1) basal energy metabolism, (2) the energy due to specific dynamic action of food, and (3) the energy for external activities.

The basal energy metabolism is usually taken with the subject at rest but awake. In sleep this minimum rate is slightly lower. When calculating total energy expenditure, it is customary to make an allowance for this difference estimated on the average to approximate a "saving" of 10 per cent.

ENERGY VALUE OF FOODS

The energy value of carbohydrates, fats, and proteins depends on their content of carbon and hydrogen. The release of this energy comes about through combustion or oxidation, as already explained, just as energy is released from coal when it burns. In the body, however, the process its much more complicated, taking place in several steps rather than in one. The actual process by which energy is released from food material in the body is still very incompletely understood, although much has been learned about it in recent years.

In order to plan for meeting the energy needs of the body, it is necessary to know the energy value of foods. The method used for determining such values embodies the same principles as form the basis for respiration calorimetry. The food is placed in an air-tight chamber, known as the *bomb calorimeter,* and burned in an atmosphere of oxygen. The heat given off is transferred to the water jacket surrounding the vessel and thus measured, or the volume of oxygen consumed may be measured and the energy value determined from this.

By this procedure values for carbohydrate, fat, and protein have been determined as follows:

1 gram of pure carbohydrate	4.1 calories
1 gram of pure fat	9.45 calories
1 gram of pure protein	5.65 calories

These foods are never quite completely burned in the body, and certain deductions must be made as shown in the table on page 87. These calculations are largely the result of the work of Rubner, and Atwater and Bryant, although the final values given here are those of Atwater.

THE ENERGY REQUIREMENT OF ADULTS [4]

(Estimate of energy requirement for one day)

I	II	III	IV
ACTIVITY	TIME (*hours*)	FACTOR (*cal. per kg. per. hr.*)	(*cal. per kg. II x III*)
Lying still, awake	0.50	0.1	0.05
Sitting	1.25	0.4	0.50
Standing relaxed	0.75	0.5	0.38
Sitting, writing, or eating	8.00	0.4	3.20
Standing at attention	0.25	0.6	0.15
Dressing and undressing	1.75	0.7	1.23
Light exercise	1.00	1.4	1.40
Walking (3 mi. per hr.)	1.00	2.0	2.00
Dancing	1.00	3.8	3.80
Skating	1.00	3.5	3.50
Walking up stairs (4 flights)		0.036	0.14
Walking down stairs (4 flights)		0.012	0.05
	16.50		16.40

Body weight, 56 kg.
Total calories for activities per kg. (sum of column IV), 16.40 cal.
Total cost of activities (56 x 16.40 cal.) 918 cal.
Saving in sleeping 7.5 hrs. (0.1 x 56 x 7.5) 42 cal.

TOTAL FOR DAY

	Calories
Basal metabolism for 24 hours (see p. 24)	1,313
Saving in sleep, to be deducted	42
Corrected basal metabolism	1,271
Cost of day's activities	918
Total cost of metabolism	2,189
"Tax" for influence of food (6 per cent)	131
Day's requirement	2,320

[4] MacLeod and Taylor, *op. cit.*

PHYSIOLOGICAL ENERGY VALUES OF FOODSTUFFS[5]

	Carbohydrate	*Fat*	*Protein*
Bomb Calorimeter (Cals. per gram)	4.10	9.45	5.65
Loss in end-products (Cals. per gram)	0.00	0.00	1.30
Coefficient of digestibility (per cent)	.98	.95	.92
Physiological energy value (Cals. per gram)	4	9	4

Mechanical efficiency of the body In the conversion of one form of energy to another, no machine is 100 per cent efficient. Much of the energy appears as heat largely used in overcoming friction. The human body offers no exception to this rule. In most engines this heat is a by-product which must be removed, as by the cooling system of an automobile or airplane engine. In the body such heat is turned to good account in maintaining body temperature, although a large excess must be removed. The mechanical efficiency of the body varies widely according to conditions, and only under the most favorable will the mechanical effect produced equal as much as 25-33 per cent of the extra energy expended for the work done.

Calculation of the energy value of food First, determine the protein, fat, and carbohydrate content of a given amount of the food in question. To do this it is necessary (a) to ascertain the percentage of protein, fat, and carbohydrate present;[6] and (b) to determine from these percentages the weight of protein, fat, and carbohydrate available from the given amount of food.

Second, find out the number of calories supplied by the food. To do this, multiply the calculated weights in grams of protein, fat, and carbohydrate in the given amount of food by the fuel value of 1 gram of each of these nutrients.

To illustrate, let us find the fuel value of one loaf of bread, weighing 12 ounces. By referring to *Circular 549,* we find that white bread (miscellaneous) yields on the average:

8.5% protein
2.0% fat
52.0% carbohydrate

[5] M. S. Chaney and M. Ahlborn, *Nutrition,* 3d Edition, Boston: Houghton Mifflin Company, 1943.

[6] Tables giving the results of many analyses are available, such as *Circular 549,* U. S. Department of Agriculture; C. Chatfield and G. Adams, *Proximate Composition of American Food Materials.* See also Table 1, page 637.

To get the weight of protein, fat, and carbohydrate in grams, we must first convert the total weight of bread into grams:

$$
\begin{aligned}
1 \text{ oz} &= 28.35 \text{ grams}\\
12 \text{ oz.} &= 340.2 \text{ grams}\\
\text{Then } 340.2 \times 0.085 &= 28.92 \text{ grams of protein}\\
340.2 \times 0.020 &= 6.80 \text{ grams of fat}\\
340.2 \times 0.52 &= 176.90 \text{ grams of carbohydrate}
\end{aligned}
$$

Multiplying the amount of each nutrient by the proper factor:

$$
\begin{aligned}
28.92 \text{ grams protein} \times 4 &= 115.68 \text{ calories}\\
6.80 \text{ grams fat} \times 9 &= 61.2 \text{ calories}\\
176.90 \text{ grams carbohydrate} \times 4 &= 707.6 \text{ calories}\\
\text{Total} &= 884.48 \text{ No. calories}
\end{aligned}
$$

Hence the total energy value of one 12-ounce loaf of bread is 884.48 calories.

To calculate the total energy value of any recipe, it is necessary to compute the fuel value of each ingredient and take the sum of the whole group. Thus, for Egg Broth, having the following ingredients, it is necessary first to get the weight in grams of each of the following ingredients and then to compute their energy value as indicated above.

Yolk of 1 egg, raw	= 16 grams
1 tablespoon sugar	= 15 grams
1 cup milk	= 240 grams

In this book values for the energy content of most food materials are given in Table 1, page 637. Therefore by reference to this table the energy value of any combination is readily ascertainable without the necessity of calculation from the percentage composition.

Yolk of 1 egg, raw	= 58 calories
1 tablespoon sugar	= 60 calories
1 cup milk (whole)	= 169 calories
Total energy value	= 287 calories

To estimate the fuel value of any diet, simply compute the fuel value of each food material used and add the results.

To calculate the energy value of an infant's formula, it is necessary to know the amounts of protein, fat, and carbohydrate present. For example, given a formula with the following percentage composition:

Protein	0.7%
Fat	2.7%
Carbohydrate	6.0%

Feedings per day 9. Amount at each feeding, 1½ ounces.

Total quantity for the 24 hours will be $1\frac{1}{2} \times 9 = 13\frac{1}{2}$ ounces.

$$1 \text{ ounce} = 28.35 \text{ grams}$$
$$13.5 \text{ ounces} = 382.7 \text{ grams}$$

Then $382.7 \times 0.007 = 2.67$ No. gm. protein needed
$382.7 \times 0.027 = 10.33$ No. gm. fat needed
$382.7 \times 0.06 = 22.96$ No. gm. carbohydrate needed

Then $2.67 \times 4 = 10.68$ calories
$10.33 \times 9 = 92.97$ calories
$22.96 \times 4 = 91.84$
$10.68 + 92.97 + 91.84 = 195.49$ calories = total fuel value for the 24 hours

When continually working with such calculations, one soon learns the caloric values for average servings of common foods, which is a distinct advantage.

QUESTIONS FOR STUDY

1. Define energy. In what forms may it be manifested?
2. How is the energy in foods measured? What methods are used in determining the energy value of food, (a) outside the body, (b) within the body?
3. Give the definition of a Calorie.
4. What are the physiological fuel values of protein, fat, and carbohydrate?
5. Calculate the energy value of ½ pint of milk, weighing 240 grams. (The composition of whole milk is as follows: 3.3% protein, 4.0% fat, 5.0% carbohydrate.) Compare your answer with the table on page 637.
6. What is a basal energy metabolism? What has the greatest influence on the total energy requirement of an individual?
7. What is the energy requirement of a man weighing 70 kilograms, engaged in moderately active muscular work? Light work? Hard work?
8. What is the energy requirement of a woman doing light muscular work? Moderate work?
9. What is the energy requirement of an infant? Of a child of three years? Of an aged person?
10. Calculate your own energy requirement.

3.
PHYSIOLOGIC PROCESSES OF NUTRITION

In its broadest sense, the term nutrition usually includes consideration of (1) the digestion and absorption of food, (2) the utilization of the products of digestion by the cells in growth and reconstruction of tissue and as a source of energy, (3) the storage of reserve nutrients, and (4) the elimination of body waste. The physiologic processes of nutrition involve:

1. Digestion—the movements of the digestive tract, the secretion of digestive juices and their action upon food in the alimentary canal.
2. Absorption—the passage of the products of digestion into the blood and lymph vessels.
3. Metabolism—the utilization of the absorbed products by the cells.
4. Excretion—the elimination of unused material, and the by-products of metabolism.

Each of these topics will be discussed in turn.

DIGESTION

Before food can be utilized in the body, it must be broken down into substances that can be absorbed into the blood stream. The blood then serves as the transporting mechanism for getting those constituents to the different tissues. The processes of digestion involve both mechanical and chemical changes.

In the *mechanical processes,* the food particles are softened, making them nonirritating to the mucous membranes. They are also finely divided, giving greater surface area for the action of the digestive juices.

By the *chemical processes* the foods are broken down into substances capable of being absorbed through the walls of the digestive tract.

Starches and carbohydrates must be changed to single sugars before they can be absorbed and utilized. Fats are converted into fatty acids

and glycerol, and proteins are reduced to simpler forms and finally to amino acids.

These changes are brought about by *enzymes,* or digestive ferments, secreted in the digestive fluids. Enzymes are catalysts that accelerate chemical changes already capable of taking place. Each enzyme is specific—that is, it will act in one kind of chemical change and in no other. The enzyme itself is not essentially changed during the action of chemical change.

The different steps involved in the complete digestion of foods are best discussed in relation to the various parts of the alimentary canal—the mouth, the stomach, and the intestines.

In the mouth The process of chewing of food simply moistens and divides it into small particles that may be swallowed. It also mixes the food with saliva secreted by the salivary glands and other small glands in the mucous membrane of the mouth. Saliva contains a starch-digesting enzyme, or *amylase,* called *ptyalin,* capable of digesting cooked starch to maltose. The effect of this salivary enzyme is of minor consequence due to the relatively short time food remains in the mouth and the variation in degree of admixture of saliva with the food.

In the stomach The chewed food is pushed by rhythmic contractions of the esophagus through the cardiac sphincter into the cardiac region of the stomach, or fundus. The wall of this part of the stomach is thin and does not show the same vigorous muscular activity as the middle and pyloric regions. It serves as a sort of reservoir for food, which may remain there from ½ to 2 hours. During much of this time the action of the ptyalin continues. As food enters the stomach, each amount added tends to form a layer in the interior of the mass already there.

The secretion of the stomach, or gastric juice, is acid in reaction due to the presence of 0.4 to 0.5 per cent hydrochloric acid. As the food gradually enters the middle and pyloric regions, the vigorous muscular contractions mix it with this gastric secretion, the peristaltic waves tending always to push the softened and partially digested food toward the pylorus. The acidity of the gastric juice stops the action of the salivary amylase. It also causes proteins to swell and partially dissolve, hydrolyzes the collagen of connective tissue, decalcifies bone, and to a degree inhibits bacterial action.

The gastric secretion contains two enzymes, *pepsin* and *rennin,* which act on proteins. Rennin acts in neutral solution, while pepsin can act

only in the presence of a definite concentration of hydrochloric acid. The function of rennin is to precipitate, or curdle, the protein, casein, of milk, causing it to remain in the stomach long enough to be acted on by pepsin and also preparing it for further digestion by enzymes secreted in the intestine.

The protein particles, more or less swollen, softened, and rendered partially soluble by the hydrochloric acid, are changed by pepsin to simpler forms from acid proteins, proteoses to peptones. These changes are not necessarily complete in the stomach.

A gastric lipase is probably also secreted by the stomach which acts on emulsified fats (milk and eggs) to split them into fatty acids and glycerol.

As the food in the stomach is moved toward the pylorus, the pressure of the food mass, or *chyme,* and the peristaltic waves of the stomach muscles influence the pyloric sphincter to open and allow passage of a portion of the food into the intestine. As digestion proceeds, the pylorus opens more and more frequently and for a longer time, permitting even solid particles of food to enter the duodenum. The length of time required for the stomach to empty itself depends on several factors: (1) the size of the meal, (2) the amount of fat present, (3) the quantity of indigestible material, and (4) the thoroughness with which the food has been chewed. Ordinarily protein stays longer in the stomach than carbohydrate, and fat longer than protein. The emptying time of the stomach may vary from 1 to 6 or 7 hours.

The presence of fat in the stomach tends to check the secretion of gastric juice and retard peristaltic movement. Hence a large amount of fat in a meal has a delaying action on digestion, sometimes so markedly as to cause discomfort. This is especially true of foods coated with fat, such as fried foods. The high temperature of frying may also break down the glycerol of fat into substances irritating to the mucous membranes. Fried foods are usually not given to patients.

In whole-grain products and starchy vegetables, the starch grains are enclosed in cellulose coats which retard the action of the digestive juices. These are softened and broken by long cooking and by thorough mastication so that digestion of the starch by the enzymes *ptyalin* and *amylopsin* is hastened.

A clear understanding of the way in which the pyloric sphincter is regulated throws considerable light on stomach digestion. We can understand why a certain quantity of indigestible residue, such as is

present in most of our staple foods—meats, vegetables, fruits, etc.—is of service in retaining food within the stomach for a time, giving the hydrochloric acid a chance to exercise its bactericidal power and favoring thorough gastric digestion.

It also explains why a meal of bolted food or of food imperfectly masticated, or a lack of free hydrochloric acid in the stomach contents, as in hyperacidity, or *achylia gastrica,* may result in fermentation, production of gas, an attack of acute indigestion, diarrhea, or relief by vomiting. The nurse will understand why a diet of liquids for a person in relatively good health does not prove satisfactory. Liquids do not stay long enough in the stomach to give a sense of fullness, give the stomach little to do, and tend to pass into the intestines poorly prepared for the action of the digestive juices there.

In the intestines As the acid chyme passes through the pylorus into the duodenum, it meets three secretions: the pancreatic juice, the bile, and the intestinal juice, all of which are alkaline and act to neutralize the hydrochloric acid in the food mass.

The *pancreatic juice* secreted by the pancreas and the bile secreted by the liver pass into the intestine through ducts opening a short distance beyond the pylorus. The pancreas is stimulated to secrete its digestive juice by the action of *secretin* poured into the blood stream as a result of the action of the acid chyme on the intestinal mucosa. The intestinal juice, *succus intericus,* is secreted from glands in the wall of the small intestine. The enzymes of the intestinal tract are more powerful in their action than those found in either the saliva or gastric juice and carry digestion to completion.

The pancreatic juice contains several enzymes: (1) a *protease,* or protein-splitting enzyme, *trypsin;* (2) an *amylase,* or starch-splitting enzyme, *amylopsin;* (3) a *lipase,* or fat-splitting enzyme, *steapsin,* and (4) a *disaccharase maltase.* The protease, trypsin, acts only after it has come in contact with the intestinal juice.

The products of tryptic digestion include alkali proteins, proteoses, peptones, polypeptides, and may even go to amino acids. Amylopsin completes the digestion of starches already acted upon by ptyalin and may also act on raw starch. Maltase changes maltose to glucose. Lipase acts on fats to give the breakdown products glycerol and fatty acids. Some of the fatty acid thus released forms soaps with the alkaline material. These soaps help to emulsify more fats and fatty acids, facilitating their digestion and absorption. Fats vary considerably in digesti-

bility. Those with low melting points, the softer fats, are digested more completely than those with higher melting points.

Bile is not a true digestive fluid in the sense of containing an enzyme, since it has none. It aids in the emulsification of fats, giving more surface area for the action of enzymes. It also renders the fatty acids more soluble so that they are absorbed. When bile is lacking, much of the fat fails of absorption and is lost in the feces.

The *intestinal juice* also contains a number of enzymes. *Erepsin* completes the digestion of proteins from proteoses and peptones to amino acids. The three disaccharase enzymes, lactase, maltase, and sucrase, act respectively on lactose, maltose, and sucrose, changing them to monosaccharides, or single sugars, capable of absorption.

After the food has been pushed along through the small intestine, it finally passes the *ileo-cecal valve* into the large intestine. This valve prevents the return of any particle of food to the small intestine from pressure of the antiperistaltic action in the anterior portion of the large intestine.

The large intestine supplies no digestive enzymes, although digestion may continue there for some time. Food moves slowly through this part of the digestive tract. The chief changes in the food mass here are due to the removal of water through absorption and the action of bacterial flora.

Summary For convenience the chemical changes taking place during the process of digestion are summarized in the following tables according to the foods acted upon and the region of the digestive tract where the action takes place.

DIGESTION OF FATS

PART OF ALIMENTARY TRACT	NAME OF SECRETION	ENZYMES ACTING	PRODUCTS FORMED
Stomach	Gastric juice	Lipase	Fatty acids Glycerol
Intestines	Pancreatic juice	Lipase (Steapsin)	Fatty acids Glycerol
	Bile	None	Emulsified fats and fatty acids

DIGESTION OF CARBOHYDRATES

PART OF ALIMENTARY TRACT	NAME OF SECRETION	ENZYMES ACTING	PRODUCTS FORMED
Mouth	Saliva	Ptyalin	Dextrin Maltose
Stomach	Gastric juice	None	Some hydrolysis of sucrose by hydrochloric acid
Intestines	Pancreatic juice	Amylopsin	Dextrin Maltose
		Maltase	Glucose
	Intestinal juice	Lactase	Glucose Galactose
		Maltase	Glucose
		Sucrase	Glucose Levulose

DIGESTION OF PROTEINS

PART OF ALIMENTARY TRACT	NAME OF SECRETION	ENZYMES ACTING	PRODUCTS OF ENZYME ACTION
Mouth	Saliva	None	None
Stomach	Gastric Juice	Rennin	Coagulates milk
		Pepsin (in acid medium)	Acid proteins Proteoses Peptones
Small Intestines	Pancreatic Juice	Trypsin (in alkaline medium)	Alkali proteins Proteoses Peptones Amino acids
	Intestinal Juice	Erepsin (acts only on proteoses and peptones)	Amino acids Ammonia

Factors affecting the rate of digestion Many factors influence the rate or rapidity of digestion. Among these are the composition of the food (especially the amount of fat present), the manner in which it is cooked and served, its palatability, its appeal to the senses of color and smell, the mental state of the individual at the time of eating, his physical condition, and the size of the meal.

The stimuli to the secretion of saliva are the sight, odor, thought, and taste of food; and the mechanical stimulation produced by the presence of food in the mouth.

The stimuli to the secretion of gastric juice are the sight, odor, thought, taste, and chewing of food; and certain substances in the food itself. The dextrin produced in salivary digestion and the proteoses and peptones resulting from the action of pepsin stimulate gastric flow. The nitrogenous extractives, which give to meat and meat preparations such as soups their characteristic flavor, are powerful stimulants. The drinking of water has a marked stimulating effect on gastric secretion. Hence the use of meat broths and the taking of a glass of water at the beginning of a meal are rational practices. Spices and condiments promote secretion, but their use may easily be overdone.

The same conditions and substances which excite secretion stimulate peristalsis in the stomach and therefore prepare it to receive the food and to digest it quickly and comfortably.

Excitement, pleasant or unpleasant, worry, and fatigue are powerful checks to both salivary and gastric secretion and to peristalsis. It has been shown that anger, fear, pain, or any strong emotion will completely stop the movements of the digestive tract in animals, and there is evidence of the same effect on humans. Calm and relaxation during meals are therefore important aids to digestion.

Food allergy or idiosyncrasy[1] In certain individuals the body cells may be hypersensitive to certain foods, and food allergy may thus become a marked tendency. Some people cannot eat mutton, however disguised; others are affected by strawberries, tomatoes, etc., no matter how small the quantity eaten. Hives, eczema, migraine, or gastro-intestinal disturbances may result from eating foods to which the person is allergic.

When this tendency is definitely established, the offending food is sought, either by skin tests or by trial diets. This food, when deter-

[1] See also page 175.

mined, must be omitted from the diet until such time as the symptoms disappear, and much care must be exercised when it is restored to the diet.

If it is established that the allergic substance is something other than food, the offending substance should be determined and care taken to avoid it.

ABSORPTION

The purpose of digestion is to break down the food particles into simpler compounds that may be absorbed through the lining membrane of the digestive tract. By this means they pass into the blood and lymph, by which they are transported to the tissues, where they are to be utilized or stored.

The physiological process of absorption is by no means a simple one. Definite physical laws of pressure, diffusion, and osmosis govern absorption through permeable membranes as it takes place in liquids outside of the body. Within the body the selective activity of the living cells is a factor that must be taken into account. For example, blood serum placed within a loop of intestine is promptly absorbed; but if the loop is surrounded by serum—that is, bathed in it—the serum does not pass into the lumen of the intestine. Absorption through living cells in mucous membrane is very different from diffusion through nonliving membranes.

In the *mouth* there is no absorption.

The *stomach* is not primarily an absorbing organ, but some of the products of digestion, such as sugars and peptones and also water, may be absorbed to a limited extent.

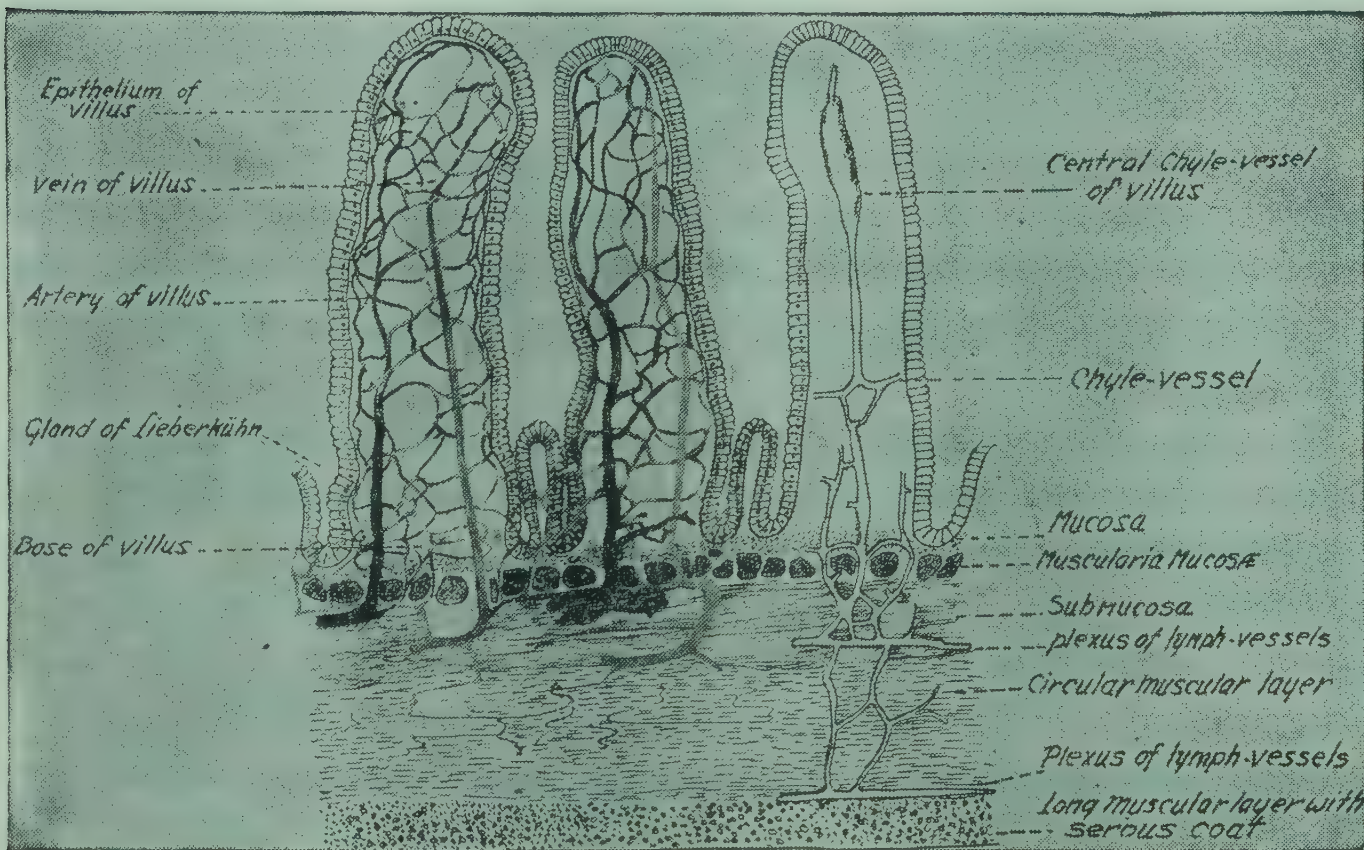
The most important seats of absorption are (1) the small intestine and (2) the large intestine.

In the *small intestine,* absorption is affected through innumerable projections of the mucosa, called *villi,* which greatly extend the surface area coming in contact with the food.

These villi are supplied with capillaries, an artery, and a vein, and are really collecting centers. The center space, or *lacteal,* is a part of the lymphatic system. The capillaries converge into larger vessels, eventually forming the portal vein, which goes to the liver. The lacteal spaces prolonged form the lymphatic vessels, which similarly converge to form the thoracic duct, emptying into the venous system by way of the left subclavian vein. The lacteals function in the absorption of fats.

All other products of digestion pass by way of the portal vein through the liver before reaching the general circulation.

The walls of the villi contain muscle tissue, which, through its expansion and contraction, aids in absorption and passage of the products of digestion through the blood vessels and lymphatics.



Diagrammatic drawing showing the great extension of absorbing surface of the intestinal lining due to projecting villi. (After F. P. Mall; from Cooper, Barber, and Mitchell, *Nutrition in Health and Disease,* Philadelphia, 1941.)

Carbohydrates Starches and sugars are reduced by digestion to hexoses, or single sugars. These are absorbed through the intestinal wall by a process of phosphorylation and pass by way of the portal vein to the liver. Small quantities of disaccharides may be absorbed by diffusion. When fed in very large quantities, lactose may pass through the intestinal tract unchanged. In the colon it forms a medium favorable to the growth of acid-forming bacteria, which help retard putrefaction.

Carbohydrates are readily fermented by bacteria in both the small and the large intestine, resulting in acetic, butyric, lactic, and other organic acids. This fermentation produces discomfort if excessive, but is not otherwise harmful and checks the putrefaction of the proteins of meat, fish, poultry, and eggs. It is for this reason that lactic acid,

SUMMARY OF DIGESTION AND ABSORPTION

PART OF ALIMENTARY TRACT	NAME OF SECRETION	REACTION TO LITMUS	ENZYMES PRESENT	FOODSTUFFS ACTED UPON	PRODUCTS OF ENZYME ACTION	ABSORPTION
Mouth	Saliva	Alkaline	Ptyalin	~~Cooked~~ starch	Dextrin Maltose	None
Stomach	Gastric juice	Acid	Pepsin	Proteins	Acid proteins Proteoses Peptones	Peptones, Sugar, and Water to a limited extent
			Rennin	Casein *	Coagulated protein	
			Lipase	Emulsified fats	Fatty acids and glycerol	
Small intestines	Pancreatic juice	Alkaline	Trypsin	Proteins	Alkali proteins Proteoses, Peptones, and Amino acids	Amino acids, Small quantities of Proteoses and Peptones into capillaries and by portal vein to liver and thence to the tissues
			Steapsin (Lipase)	Fats	Fatty acids and Glycerol	Neutral fats into Lacteals and thence to the lymphatics
			Amylopsin Maltose	Starch Maltose	Dextrin Maltose Glucose	Small quantities disaccharides to capillaries by diffusion
	Intestinal juice	Alkaline	Erepsin	Proteins in the form of Proteoses and Peptones	Amino acids Ammonia	Hexoses or single sugars by process of phosphorylation into capillaries and by portal vein to the liver
			Sucrase	Sucrose	Glucose and Levulose	
			Maltase Lactase	Maltose Lactose	Glucose Glucose and Galactose	
	Bile †					

* Milk Protein.

† The bile contains no digestive enzymes, but greatly facilitates the digestion and absorption of fats. The intestinal juice contains an enzyme which makes trypsin an active enzyme, and a substance which helps to stimulate the flow of pancreative juice.

especially in the form of buttermilk and artificially fermented milks such as Acidophilus and Bulgarlac, is used in treating intestinal putrefaction.

Fats The end-products of the digestion of fats, glycerol and fatty acids, are recombined into neutral fats during passage through the intestinal wall. It is possible that some of the finely emulsified fats are able to pass unchanged. Only a small portion of digested fat passes directly into the blood stream.

Proteins The end-products of the digestion of proteins are amino acids, with smaller quantities of the intermediate products—proteoses and peptones. Amino acids are absorbed from the intestines, pass by way of the portal vein to the liver, and thence by the general circulation to the tissues, where they are utilized as needed. Traces of protein, proteoses, or peptones may be absorbed from the stomach or intestines, but ordinarily the amount is negligible.

Mineral matter Absorption of mineral matter takes place largely in the small intestine. During digestion, salts of the mineral elements are set free and diffuse more or less rapidly through the digestive fluid. In solution they are readily absorbed and require no further change by digestion. Common salt is most quickly absorbed.

The *large intestine* is the main seat of the absorption of water, which is aided by the antiperistaltic action in the anterior portion. The rapidity of absorption may be considerably influenced by the amount of mineral matter dissolved. The gradual dehydration of the food mass gives it the character of feces.

METABOLISM

When the food has been digested and absorbed, it is carried by the blood stream to the tissues, where it may undergo further changes and is utilized or stored. Metabolism is the term used for the chemical changes that take place in tissues through the action of the individual cells. Some of these changes are concerned with the growth of new tissue, some with the replacement of worn-out tissue, and still others with the conversion of the latent energy of food into muscular work and heat which maintains normal body temperature.

Carbohydrates The chief function of carbohydrates in metabolism is to furnish energy. The sugars from digestion of carbohydrates reaching the liver by way of the portal vein are converted into glucose. That

for immediate body needs is taken up by the circulating blood and carried to the tissues, where it is utilized.

Quantities of glucose in excess of immediate needs are converted into glycogen and stored. Glycogen is present in nearly all tissues of the body, but the largest amounts are stored in the liver and muscles.

When carbohydrate is not supplied in the food in large enough amounts, this stored glycogen is converted into glucose and enters the blood stream. Normal blood contains a fairly constant glucose content of approximately 0.1 per cent.

There is a limit to the amount of glycogen that tissues can store. When this has been reached, the glycogen is converted into fat, and this substance is then stored.

The processes by which glucose is oxidized to yield energy in the body are still incompletely understood, although results from the field of vitamin research have thrown considerable light on the subject. Several of the vitamins of the B complex are known to function in the oxidation and reduction processes that take place in cells.

The end-products of the oxidation changes leading to the release of energy from carbohydrates are carbon dioxide and water.

Fats Fats, like carbohydrates, are prime sources of energy. When fat has been digested and absorbed, it reaches the blood stream from the lymph vessels. It is rapidly distributed to the tissues, where it is utilized or stored. Unless excessive amounts of fat have been ingested, the resynthesized fat formed during absorption is like that of the animal's own body fat.

In the process of oxidation for release of energy, fats are first split into glycerol and fatty acids. In its chemical structure glycerol is related to one of the intermediate products formed during the oxidation of glucose. Thus glycerol is readily oxidized, or it may be converted into glucose and utilized in that form. Glycerol accounts for about one-twentieth of the energy of the fat molecule.

The process by which energy is obtained from the fatty acids is still not clear. The breakdown seems to take place in several stages with the production of such intermediate products as *beta oxybutyric acid, aceto acetic acid* and *acetone*. The end-products of complete oxidation are carbon dioxide and water.

In certain disease conditions, oxidation of fat is not complete. As a result there is an accumulation of these intermediate products, or acetone bodies, in the blood. They tend to reduce the normal slight alka-

linity of the blood, giving rise to the acetone type of acidosis. These substances are excreted in the urine or through the lungs.

Proteins Amino acids from the digestion of protein after absorption into the blood stream are transported to the tissues for utilization in the structure of parts of cells or the components of cell secretions. About 22 individual amino acids are known, and these are combined with other chemical groups to form the characteristic tissue proteins.

The utilization or breakdown of protein in the body involves splitting off of the nitrogenous radicle (*deaminization*) of the molecule, leaving a nonnitrogenous residue that undergoes further metabolism.

Ammonia is formed in the process of deaminization, and this in turn is converted to urea and excreted through the kidneys. The nonnitrogenous fraction is capable of giving rise to substances similar to the intermediate products of carbohydrate metabolism that may be utilized as sources of energy. While carbohydrates and fats should be considered as the chief sources of energy, proteins are not without value in this respect. Because excretion of nitrogenous end-products is involved proteins should not be relied on too heavily as sources of energy, especially by those with weak or diseased kidneys.

Protein and amino acids cannot be stored to any extent. Excess amounts of protein are broken down into amino acids. The amino acids are deaminized as described and thus eliminated.

EXCRETION

The end-products of metabolism, together with all unutilized food, must be eliminated from the body. Water escapes through the lungs, the skin, and the kidneys. Aside from the visible perspiration which appears as moisture, a steady evaporation takes place from the skin (insensible perspiration). Carbon dioxide, an end-product of energy metabolism, escapes by the lungs, and the nitrogenous products of protein metabolism in the urine. The excretion of minerals is partly by way of the kidneys and partly through the intestine. Sodium chloride appears in the perspiration.

The feces contain some undigested food and indigestible food residues, but they consist largely of intestinal secretions, excreted products of metabolism, cellular material, and bacteria. The longer the feces remain in the large intestine, the greater is the opportunity for bacterial action on carbohydrate and protein and for absorption of the products.

Since some of these are toxic, delayed evacuation of intestinal waste (constipation) is undesirable.

QUESTIONS FOR STUDY

1. What does the term "nutrition" include?
2. Name and describe the two processes concerned in digestion.
3. Describe digestion in the mouth. What enzymes are present? On what substances do they act? What products are formed?
4. What digestive fluid is secreted by the stomach? What enzymes does it contain? What changes in food do they cause?
5. What are the functions of the hydrochloric acid of the gastric juice?
6. What means have we of stimulating the flow of gastric juice? Of saliva?
7. What controls the opening of the pyloric sphincter?
8. What digestive fluids are present in the small intestine? What enzymes does each contain? On what substances do they act? What products are formed?
9. Describe the part which bile plays in digestion.
10. Outline the digestion of protein, fat, and carbohydrate from the time each enters the mouth until it is absorbed.
11. What is meant by food allergy?
12. In what part of the digestive tract does absorption take place?
13. Describe the absorption of proteins, fats, carbohydrates, mineral matter, and water.
14. Discuss the metabolism of protein. What becomes of the nitrogen? What becomes of the nonnitrogenous part of the protein molecule? What are the end-products of protein oxidation?
15. Discuss the metabolism of fat. What products are formed when it is not completely oxidized?
16. What becomes of carbohydrate after absorption? What are the end products of its oxidation?
17. In what ways does the body rid itself of its waste products?

4.
NUTRITIVE REQUIREMENTS AND THE NORMAL DIET

We have discussed in earlier chapters the nutritive essentials which the diet must supply. Throughout the discussion the term "deficiency" is used to describe the condition of malnutrition caused when the diet continually supplies less than enough of a nutritive essential. Thus a concept of an essential quantity of each essential nutrient is introduced. It is not enough that the food eaten should supply the nutritive essentials; it must also supply an adequate amount of each. "Nutritive requirements" is the term used to indicate this quantitative relationship.

In planning diets or assessing the adequacy of diets it is desirable to have values which express these nutritive requirements; and in this connection there are certain problems which those who use such values should recognize and thoroughly appreciate. Many factors influence the requirements of each of the nutritive essentials; hence the values for actual requirements may vary widely from individual to individual, and even for the same individual at different times and under different conditions. Age, sex, weight, pregnancy and lactation are the factors generally considered. As time goes on and more is learned of their effect, doubtless others will also receive attention.

Nutritive requirements versus dietary allowances The essential nature in the diet of many of the nutrients was recognized through observing the appearance of symptoms of disease in man or an experimental animal when his diet did not contain the nutrient in question. The use of the term "deficiency disease" came about as a result of such observations.

Reversal of the procedure—that is, checking on the recovery of a subject with symptoms of a deficiency disease when the required nutrient was supplied in his diet—gave final proof of the specific nature of this nutrient. Such a study also gave information as to the quantity of the

nutrient needed for the cure of the disease and presumably also its prevention.

In a sense this quantity represents the requirement, but it is the *minimum requirement.* It is the smallest amount that will support the organism. There is no allowance for overhead. A better term for such amounts and one that has been used is "minimum protective dose." Since "dose" implies medication, the term does not enjoy good standing in nutrition parlance.

With the problem of variation from individual to individual to deal with, and in view of the uncertainty regarding actual values for requirements of several nutrients, nutritionists have adopted the policy of offering values, to be used in planning diets, that are considerably in excess of those estimated as expressing minimum or actual requirements. Such values are described as *allowances* or, more exactly, as *dietary allowances.*

For purposes of planning diets they are intended to take care of variation in requirement from day to day, and from individual to individual. They offer an insurance against risk when planning an adequate diet to meet all needs. It is important to keep this fact in mind. Amounts of nutrients suggested as dietary allowances are designed to keep body stores well supplied. An intake slightly below these amounts does not mean that an individual is in imminent risk of experiencing the discomforts of a deficiency disease.

A table of Recommended Dietary Allowances for the more generally considered nutrients prepared by the Food and Nutrition Board of the National Research Council will be found on page 112. The use of this table should be preceded by a reading of the accompanying text, pages 113 and 114.

A table of Values for Minimum Dietary Requirements used by the Food and Drug Administrations, Federal Security Agency, in connection with the labeling of special-purpose foods is given on page 114.

Values for minimum requirements should be used with some caution, since they may not express the needs of some individuals. In the case of the vitamins at least, therapeutic doses for the treatment of well-advanced cases of deficiency diseases are usually several times amounts given as requirements. This is indicated from the values in the following table:

INTAKE PER MAN PER DAY [1]

	VITAMIN A I.L.	ASCORBIC ACID *mgm.*	THIAMINE *mgm.*	RIBO-FLAVIN *mgm.*	NICO-TINIC ACID [2] *mgm.*
Preventive	2000–5000	25–50	1–3	1–3	5–20
Therapeutic	10000–30000	100–300	3–10	3–10	50–300

Whether one is using values offered as indicating actual requirements or those selected as dietary allowances, it is essential to realize that considerable judgment was involved in their selection. At best they represent approximations on the basis of present knowledge.

The need for keeping abreast of revisions offered by authoritative investigators should be kept in mind. Nutrition as a science is relatively new; and, although great progress has been made in a remarkably short time, establishment of certain criteria await the results of more extensive research than has been carried out up to the present. Values for nutritive requirements must be considered in this category.

The situation as regards the vitamins is especially indecisive. Methods at present in use are much in the development stage and in no degree standardized. Each investigator has his own method of interpretation, and comparison of results from different studies gives considerable basis for argument. Even the more generally accepted values representing the combined judgment of a number of experienced investigators must be accepted as best estimates and subject to revision as new evidence becomes available.

PROTEIN REQUIREMENT [3]

The protein requirement is best expressed in terms of body weight. On the basis of nitrogen-balance experiments, Sherman gives the minimum protein requirement at approximately 0.6 gram per kilogram of body weight. With an allowance of 50 per cent for adequacy, this gives a dietary allowance of 0.9 gram or, in round figures, 1.0 gram per kilogram. For young children under 6 years of age, the requirement is given as 2 to 2.5 grams per kilogram.

A safe protein allowance for both adults and children is provided

[1] F. J. Stare, "Nutrition in Medicine," in *Journal of the American Dietetic Association*, 20 (December 1944), 756.

[2] Nicotinamide preferable.

[3] See also Table of Recommended Dietary Allowances, page 112.

when from 10 to 15 per cent of the calories for the day are available in protein foods. Thus, for a person whose energy requirement is 3000 calories per day, between 75 to 112 grams of protein, 300 to 450 calories, is ample.

MINERAL REQUIREMENTS [3]

The minerals of chief concern are calcium and iron. When the requirement for these has been satisfied, it may generally be assumed that other minerals are supplied in adequate amounts.

Calcium The adult needs a daily supply of calcium to replace that lost through excretion, while the child needs an additional amount for the formation of teeth and bones. The estimated average calcium requirement of the adult is placed at 0.55 gram daily, giving a value for the allowance as 0.8 gram.

During pregnancy there is an increased demand for calcium. The mother must have a supply sufficient not only for her own needs, but for the needs of the child as well. Nature takes care of the needs of the child first. If there is an insufficient amount of calcium in the mother's diet, calcium for the child may be drawn from the mother's tissues. In this case the teeth are the first to be affected—hence the adage, a tooth for every child.

Iron Determinations of iron requirement are difficult to make. Values reported range from 3.7 to 11 milligrams, with an average of 8 milligrams suggested by Sherman.[4] From this average a satisfactory allowance is given as 12 milligrams. It has been found that iron retention in infants does not take place until the intake is at least 0.5 to 0.6 milligram per kilogram and increases as the intake is increased up to 1.0 to 1.5 milligrams. For older children, values based on dietary studies range from 0.37 to 0.53 milligram per kilogram of body weight.

Information on requirements during pregnancy is insufficient for a reliable estimate, although there is some evidence that as much as 20 milligrams per day can be used profitably.

The iron requirement of adults and children can be met if whole-grain cereals, green vegetables, eggs, and fruits high in iron are used liberally, as well as some meat.

[4] H. C. Sherman, *Chemistry of Food and Nutrition,* 6th Ed. New York: The Macmillan Company, 1944, p. 288.

VITAMIN REQUIREMENTS

During the more than thirty years since vitamins were recognized as essential constituents of the diet, consistent efforts have been made to determine the amounts to be accepted as meeting requirements. Although it is now possible to give approximate values for vitamin A, thiamine, and ascorbic acid, we are far from knowing the actual requirements or the factors on which they depend. The value suggested for vitamin D is very tentative and applies only to children.

Intensive studies now under way should produce results that may serve as bases for acceptable estimates not only of these better-known vitamins, but also of those more recently recognized as essential in the diet of man. Until such data are at hand, the most satisfactory method of assuring an adequate intake of all of the vitamins is through the liberal use of milk and milk products, eggs, fresh fruits and vegetables, green and leafy vegetables, cereals of the whole-grain or enriched variety, and some lean meat or fish.

Vitamin A The requirement for vitamin A seems to be related to body weight. Growing children need considerably more in proportion to their weight than do adults, and the requirement of women increases during pregnancy and lactation.

REQUIREMENT FOR VITAMIN A [5]

	INTERNATIONAL UNITS [6] PER DAY
Adults: Minimum	2000
Adequate allowance	3000– 5000
Optimum	6000–10,000
Children: Adequate allowance	6000

Thiamine This vitamin is specifically concerned in the utilization of carbohydrate. The requirement is therefore related to energy expenditure and also to body weight. An abundant supply of thiamine in the diet is particularly important during pregnancy and lactation, and the allowance should be considerably greater than that suggested for the adult.

[5] See also Table of Recommended Dietary Allowances, page 112.
[6] For meaning, see page 41.

REQUIREMENT FOR THIAMINE [7]

	MICROGRAMS PER DAY
Adults: Minimum	800
Adequate allowance	1500–2200
Optimum	2300–3000
Children: Adequate allowance	1800–2000

Ascorbic acid A certain amount of vitamin C is needed in the diet each day to keep the tissues saturated. This amount may be determined experimentally within relatively narrow limits. If it is accepted as indicating the requirement, we may say that the value for the requirement of vitamin C can be given with considerably more assurance than can estimates of requirements for other vitamins.

When the intake of ascorbic acid exceeds immediate body needs and the tissues are already saturated, the excess is not stored, but is excreted rapidly in the urine.

REQUIREMENT FOR ASCORBIC ACID [7]

	MILLIGRAMS PER DAY
Adults: Minimum	25–30
Adequate allowance	50–75 [8]
Optimum	80 or more
Children: Adequate Allowance	30-80 according to age

Vitamin D The need for vitamin D is greatest during the period of growth—that is, during infancy, childhood, and adolescence. The amount of vitamin D needed by the adult is not known, but it is assumed that the requirement is ordinarily met by that obtained from food and through exposure of the body to sunlight. The requirement of women is greater during pregnancy and lactation than at other times.

[7] See also Table of Recommended Dietary Allowances, page 112.
[8] During pregnancy and lactation, the value may be twice the amount.

REQUIREMENT OF VITAMIN D

	INTERNATIONAL UNITS [9] PER DAY
Adults:	not known
Recommended during pregnancy and lactation	400–800
Children: Minimum to prevent rickets	135
Recommended for full protection	at least 400
Optimum	800

Riboflavin Estimates of the riboflavin requirement are based on results from one or two studies. The first values suggested were made on the basis of dietary studies. Suggested values for the requirement of this vitamin must be considered tentative.

RIBOFLAVIN REQUIREMENT [10]

	MICROGRAMS PER DAY
Adult: Adequate allowance	1.5–2.5
Children: Adequate allowance	.9–2.5 according to age

Other vitamins The requirements for nicotinic acid, vitamin K, and vitamin E are not known. With a diet made up of a wide variety of foodstuffs and selected to meet the requirements for vitamin A, thiamine, and ascorbic acid, there is no great chance of a deficiency or even less than an adequate allowance of the other vitamins.

Vitamin supplement Pure preparations and concentrates of the various vitamins are available commercially. *When directed by a physician,* these may be used to supplement the vitamins furnished by the diet, or in cases where unfavorable symptoms demonstrate a deficiency of any particular vitamin.

ENERGY REQUIREMENTS

The method of calculating total energy expenditure for the day is described on pages 87-88. For general purposes of dietary planning, such a detailed method of calculation is not required. Average values for total energy requirements for the day for children of different ages and

[9] For the meaning, see page 42.
[10] See also Table of Recommended Dietary Allowances, page 112.

adults engaged in occupations representing different degrees of activity have been prepared, and these are satisfactory for most purposes. If a special case requires it, the detailed procedure for approximating exact requirements may be used provided the data for the individual concerned are at hand.

DAILY ENERGY REQUIREMENT ACCORDING TO OCCUPATION [11]

TYPE OF OCCUPATION	TOTAL CALORIES PER DAY *Men*	*Women*	*Cal. per Kg. per day*
At rest but sitting most of day	2000–2200	1600–1800	30–33
Work chiefly done sitting	2200–2700	1900–2200	34–37
Work chiefly done standing or walking	2800–3000	2300–2500	38–42
Work developing muscular strength	3100–3500	2600–3000	43–50
Work requiring very strong muscles	4000–6000	....	55–70

TOTAL CALORIES FOR CHILDREN IN TERMS OF BODY WEIGHT [11]

AGE IN YEARS	CAL. PER KG. PER DAY		CAL. PER LB. PER DAY	
UNDER 1 YEAR	100		45	
1–3	100–96		45–44	
4–6	92–84		42–38	
7–9	80–75		36–34	
10–12	73–69		33–31	
	BOYS	GIRLS	BOYS	GIRLS
13–15	68–66	63–52	31–30	29–24
16–20 [12]				
Very active	78	54	35	25
Moderately active	59	43	27	20
Inactive	39	37	18	17

TOTAL DAILY ENERGY NEEDS OF INFANTS BY MONTHS

AGE, MONTHS	CAL. PER DAY	AGE, MONTHS	CAL. PER DAY
1	500	7	820
2	610	8	860
3	675	9	880
4	720	10	900
5	760	11	940
6	795	12	1000

[11] G. MacLeod and C. M. Taylor, *Rose's Foundations of Nutrition,* 4th ed., New York: The Macmillan Company, 1944. By permission of the publishers.

[12] Based on average weight for age and the energy allowances recommended by the Food and Nutrition Board of the National Research Council of the United States of America, as given on page 112.

TABLE OF RECOMMENDED DIETARY ALLOWANCES [13]

	CALORIES	PROTEIN (Grams)	CALCIUM (Grams)	IRON Mg.	VITAMIN A *** I.U.	THIAMINE (B_1) Mg. **	RIBOFLAVIN Mg.	NIACIN (Nicotinic acid) Mg.	ASCORBIC ACID Mg.**	VITAMIN D I.U.
Man (70 Kg.)										
Sedentary	2500	....	....	....	....	1.5	2.2	15	....	....
Moderately active	3000	70	0.8	12	5000	1.8	2.7	18	75	†††
Very active	4500	....	....	....	....	2.3	3.3	23	....	....
Woman (56 Kg.)										
Sedentary	2100	....	....	....	....	1.2	1.8	12	....	....
Moderately active	2500	60	0.8	12	5000	1.5	2.2	15	70	†††
Very active	3000	....	....	....	....	1.8	2.7	18	....	....
Pregnancy (latter half)	2500	85	1.5	15	6000	1.8	2.5	18	100	400 to 800
Lactation	3000	100	2.0	15	8000	2.3	3.0	23	150	400 to 800
Children up to 12 years:										
Under 1 year †	100/Kg.	3 to 4/Kg.	1.0	6	1500	0.4	0.6	4	30	400 to 800
1–3 years ††	1200	40	1.0	7	2000	0.6	0.9	6	35	†††
4–6 years	1600	50	1.0	8	2500	0.8	1.2	8	50	....
7–9 years	2000	60	1.0	10	3500	1.0	1.5	10	60	....
10–12 years	2500	70	1.2	12	4500	1.2	1.8	12	75	....
Children over 12 years:										
Girls, 13–15 years	2800	80	1.3	15	5000	1.4	2.0	14	80	†††
16–20 years	2400	75	1.0	15	5000	1.2	1.8	12	80	....
Boys, 13–15 years	3200	85	1.4	15	5000	1.6	2.4	16	90	†††
16–20 years	3800	100	1.4	15	6000	2.0	3.0	20	100	....

* Tentative goal toward which to aim in planning practical dietaries; can be met by a good diet of natural foods. Such a diet will also provide other minerals and vitamins, the requirements for which are less well known.

** 1 mg. thiamine equals 333 I.U.; 1 mg. ascorbic acid equals 20 I.U.

*** Requirements may be less if provided as vitamin A; greater if provided chiefly as the pro-vitamin carotene.

† Needs of infants increase from month to month. The amounts given are for approximately 6-8 months. The amounts of protein and calcium needed are less if derived from human milk.

†† Allowances are based on needs for the middle year in each group (as 2, 5, 8, etc.) and for moderate activity.

††† Vitamin D is undoubtedly necessary for older children and adults. When not available from sunshine, it should be provided probably up to the minimum amounts recommended for infants.

[13] Food and Nutrition Board, National Research Council, Washington, D. C., No. 115, Jan. 1943.

Further recommendations, adopted 1942 The requirement for *iodine* is small; probably about 0.002 to 0.004 milligram a day for each kilogram of body weight. This amounts to about 0.15 to 0.30 milligram daily for the adult. This need is easily met by the regular use of iodized salt; its use is especially important in adolescence and pregnancy.

The requirement for *copper* for adults is in the neighborhood of 1.0 to 2.0 milligrams a day. Infants and children require approximately 0.05 per kilogram of body weight. The requirement for copper is approximately one-tenth of that for iron.

The requirement for *vitamin K* is usually satisfied by any good diet. Special consideration needs to be given to newborn infants. Physicians commonly give vitamin K either to the mother before delivery or to the infant immediately after birth.

In using these recommendations, it is important that the purpose and general policies in formulating them should be understood:

What the allowances provide The allowances for specific nutrients are intended to serve as a guide for planning adequate nutrition for the civilian population of the United States. The quantities given were planned to provide not merely the minima sufficient to protect against actual deficiency disease but a fair margin above this to insure good nutrition and protection of all body tissues. Since the actual requirements for these purposes are not known it is recognized that the margins of safety may vary considerably foı the different factors. The Board realizes that the values proposed will need to be revised from time to time as more knowledge of nutritive requirements becomes available.

No allowances for losses in cooking It should be pointed out that the vitamin figures are calculated requirements for food as eaten and do not allow for losses in cooking. Since such losses may be extensive, especially of the water-soluble vitamins, provisions should be made for them in planning practical dietaries.

Other factors for which allowances are not given In addition to the three factors of the B complex included, other members of the group, such as vitamin B_6 and pantothenic acid, should be given consideration. But at the present time no specific values can be given for the amount required in the human dietary. It should be added, however, that foods supplying an adequate amount of thiamine, riboflavin, and niacin (nicotinic acid) will tend to supply an adequate amount of the remaining B vitamins. Similarly, diets providing adequate amounts of protein, calcium, and iron will tend to supply other needed minerals, though these are not listed. There is urgent need for continued research on the requirements for all dietary essentials, especially for children.

Allowances based on average size, sex, and activity for normal individuals The allowances for adults are given for the 70-kg. man and the

56-kg. woman at three levels of activity. They will need to be proportionately increased or decreased for larger or small individuals. It will be noted that the allowances for thiamine, riboflavin, and niacin (nicotinic acid) are proportional to the caloric intake. This relationship has been established for thiamine, and it has been assumed to hold also for riboflavin and nicotinic acid; since, like thiamine, they are part of the enzymic system involved in the metabolism of carbohydrate.

The allowances for children are given by age groups, and for boys and girls separately after 12 years, since from that age the growth curves and levels of activity for the two sexes differ. The values presented are in each case for the middle year in the group, and represent amounts needed for children of average size and activity. The needs for individual children may be proportionately larger or smaller depending upon size and activity.

It is to be understood that these allowances are for persons in health, and that needs may vary markedly in disease. For example, in febrile conditions there is usually an increased need for calories, thiamine, and ascorbic acid. The need for these or other constituents may also be greatly altered in other diseases, especially those of the alimentary tract, which interfere with normal absorption.

TABLE OF MINIMUM DIETARY REQUIREMENTS[14]

	CALCIUM (*Grams*)	PHOSPHORUS (*Grams*)	IRON (*Mg.*)	IODINE (*Mg.*)	VITAMIN A (*I.U.*)	THIAMINE (*Mg.*)	ASCORBIC ACID (*Mg.*)	RIBOFLAVIN (*Mg.*)
Persons 12 or more years of age	0.75	0.75	10	0.1	4000	1.0	30	2.0
Pregnant or lactating woman	1.5	1.5	15	..	....	....	..	..
Child 1 to 12 years	0.75	0.75	7.5	0.1	3000	0.50-0.75	20	†
Infant (under 1 year) ‡	...	...	...	..	1500	0.25	10	0.5

Vitamin D requirement is considered to be 400 I.U. or U.S.P. units irrespective of age

† Requirement not established.

‡ Labels of products represented as substitutes for human milk are required to bear statements that additional quantities of vitamins or iron should be supplied from other sources, if in each 100-calorie portion there should be less than 30 U.S.P. units of vitamin C, less than 50 U.S.P. units of vitamin D, or less than 0.75 mg. of iron.

[14] Prepared by the Food and Drug Administration. Federal Security Agency, Washington, D. C.

THE NORMAL DIET

In its simplest terms the normal diet may be described as a selection of foods that together will supply the substances required by the body for its functions in amounts to meet all of its needs. The dietitian must know how to make such selections of food for individuals and groups of individuals of all ages, and for both the sick and the well. More than this, it is necessary to know how to prepare and combine these foods in palatable dishes, how to prepare them so as to conserve the highest nutritive values, and, finally, how to serve them in a pleasing and attractive manner.

The planning of adequate diets requires a knowledge of (1) the requirements of the body [15] and (2) the nutritive value of foods.[16]

A *basic plan* for building the normal diet should make use of the following fundamental principles:

1. It must contain sufficient energy foods—carbohydrates and fats—to meet energy requirements. Maintenance of normal weight is one criterion that may be used for judging this.[17]
2. It must supply proteins adequate for growth and maintenance.
3. The content of minerals must be adequate for growth in children and maintenance in adults.
4. It must contain foods that will provide an abundance of the vitamins.
5. Sufficient bulk or residue must be present to promote normal bowel movement.
6. An adequate supply of water must be included, but not necessarily consumed at mealtime.

CALCULATING THE DIET

The calculated diet is an important feature of dietary management in nutrition clinics and in hospitals. Specifications for diets may cover all nutrients or only those to be considered in special cases. Computations are readily made by using the information on nutritive requirements in the preceding pages, together with the data on the composition of foods in Table 1, page 637. The chart on the opposite page shows one plan

[15] See pages 111, 114.
[16] See Table 1, page 637.
[17] E. Neige Todhunter, *Your Weight, Sign Post to Health and Longer Life,* University of Alabama [no date].

used successfully at the Boston Dispensary for calculating the normal diet.[18]

Successful planning of diets involves more than selection of food. To be most effective, diets should be planned with reference to environmental and other factors relating to the individual or group concerned. Factors to be kept in mind in connection with patients include income and expenditure, nationality, education, food within and outside the home, sleep and rest, body cleanliness, bowel elimination, the occupation and daily regimen, recreation, and the interrelationship of food and mental attitude.[19] Many of these apply in the case of normal individuals as well as patients.

FOOD SELECTION PLANS

Computation of diets is a tedious method of assuring an adequate supply of nutrients. For everyday living a more practical scheme is needed. Plans for choosing the proper foods for everyday living are based upon the classification of foods according to the nutrient in which they are richest.

It is now common practice to set up plans for selecting foods for an adequate diet on the basis of food groups. Not all authorities make the same groupings, and several very satisfactory plans have been suggested. Some of these are given here for convenience, and others may be found elsewhere. In using them it should be kept in mind that they are suggested plans, and modifications may be made in them as the need dictates.

PLAN NUMBER I

The Consumer Service Department of the General Foods Corporation designed this plan as one easy to remember and generally applicable.

A Plan for the Day's Choice of Food

Use these foods for good meals and good nutrition!

MILK OR MILK PRODUCTS

Try to include 1½ pints to 1 quart milk daily for each child, 1 pint for each adult.

Use milk in all its forms—fresh whole, or skim milk, evaporated

[18] From Frances Stern, *Applied Dietetics,* 2nd ed., Baltimore: Williams & Wllkins Co., 1943. This book contains a detailed discussion of the construction of normal and therapeutic diets by an eminent authority on the subject.

[19] *Ibid.,* p. 41.

CALCULATION OF DIET B. D. No.

CARD NAME AV. WT. . . . . KILOS

Date		FOOD ORDER											FOOD INTAKE													
	FOODS	GRAMS					Milli-grams	I.U.	Micro-grams	Micro-grams	Milli-grams	Milli-grams	GRAMS PER MEAL			GRAMS					Milli-grams	I.U.	Micro-grams	Micro-grams	Milli-grams	Milli-grams
194		Total Amt.	C	P	F	Ca	Fe	Vita-min A	Thia-mine	Ribo-flavin	Nia-cin	Ascor-bic Acid	Morn.	Noon	Night	Total Amt.	C	P	F	Ca	Fe	Vita-min A	Thia-mine	Ribo-flavin	Nia-cin	Ascor-bic Acid
ORDER	Milk																									
	Cheese																									
	Eggs																									
	M. F. C.																									
	Bacon																									
	Butter																									
	Fats																									
	Fruit %																									
	%																									
	%																									
	Veg. %																									
	%																									
	Potato																									
INTAKE	Cereal																									
	Bread																									
	Crackers																									
	Sugar																									
	Dessert																									
	Totals																									

Total Calories

Boston Dispensary Food Clinic FM 49A

20 Stern, Frances: *Applied Dietetics:* The Planning and Teaching of Normal and Therapeutic Diets, 2nd Edition, The Williams and Wilkins Company, Baltimore, 1943.

milk, dried milk, or buttermilk; and use all kinds of cheese and cheese dishes.

Serve milk to drink, on cereals, in beverages like Baker's Cocoa, Postum, in soups, creamed or scalloped dishes, Minute Tapioca creams, custards, and other puddings.

FRUITS AND VEGETABLES

Several servings daily.

Include fruit or vegetable rich in vitamin C, such as oranges, grapefruit, tomatoes, cabbage, strawberries, cantaloupe.

Serve raw vegetable salads often or quickly cooked vegetables, including cabbage, cauliflower, broccoli, kale, collards, chard, peppers, and parsley. Turnips, rutabagas, and kohlrabi are also rich in vitamin C. And white potatoes, when used in fairly large quantities, count as an important source of this vitamin, as well as of the important vitamin B_1.

Include green or green leafy vegetable.

Use fresh or quick-frozen green vegetables, such as spinach, broccoli, Brussels sprouts, asparagus, green beans, lima beans.

Use other fruits and vegetables, including potatoes. And serve yellow fruits and vegetables often, such as apricots, peaches, carrots, summer and winter squash, sweet potatoes.

Remember that Birds Eye quick-frozen fruits and vegetables have the same nutritive value as the freshest foods bought at market.

MEAT, POULTRY, FISH OR EGGS

Some every day.

These are the protein foods; included also are cheese, dried beans (navy, lima, soybeans), dried peas, lentils and peanuts (peanut butter)—all rich in protein. Whole-grain and restored cereals have many of the nutritive values of meat; use these to "stretch" meat or other protein foods. And use liver, heart, and kidney often; they are rich sources of important nutrients.

CEREALS

Use freely every day.

Choose whole-grain cereals or cereals with the important values of the whole grain—iron, niacin, and vitamin B_1. These include Grape-Nuts, Grape-Nuts Flakes, Wheat Meal, Post's 40% Bran

Flakes, Post Toasties. Bran Flakes also help supply bulk. Serve both hot and ready-to-eat cereals with milk for breakfasts, luncheons, and suppers. And use cereals for making quick breads, to supplement meat, fish, eggs, cheese, and other proteins in main dishes, for nutritious stuffings or crumbing, and to combine with milk and fruit in making custards, bettys, and other desserts.

BREAD

Use dark breads and enriched white bread. These may include breads made from Post's 40% Bran Flakes, Grape-Nuts, or Grape-Nuts Flakes; all suply important whole-grain values.

FATS AND OILS

Use butter or margarine containing vitamin A.

Use other fats and oils as needed; if necessary to cut down on calories, start with these.

SUGAR AND DESSERTS

Serve in ways to use milk, eggs, fruit, cereal.

Desserts can satisfy the appetite for sweets and at the same time be nutritious when they include these other necessary foods. Use a variety of dishes such as fruited Jell-O Minute Tapioca fruit puddings, egg soufflés, and creams, Jell-O puddings made with milk, as well as Jell-O frozen mixtures, Swans Down cakes, and Baker's Chocolate or Coconut desserts.

Foods containing a high proportion of starch, fat, or sugar are energy foods. The quantity of such foods in the diet should be adjusted according to energy needs or the work a person does. When eaten in greater quantities than needed, these foods become sources of body fat.

TRY ALWAYS TO INCLUDE EACH DAY—MILK, FRUITS AND VEGETABLES; MEAT, FISH, CHEESE, OR EGGS, WHOLE-GRAIN CEREALS OR CEREALS WITH WHOLE-GRAIN VALUES; AND WHOLE-GRAIN OR ENRICHED WHITE BREADS.

PLAN NUMBER 2

This plan, using eleven food groups, was prepared by the United States Department of Agriculture.[21]

[21] *Family Food Plans for Good Nutrition.* U. S. Dept. of Agriculture, Bulletin AWI-78. December 1943.

A Handy Guide to Your Food Groups

MILK

Fresh, evaporated, dried, or as cheese, buttermilk, cream, or ice cream.

Use at least this much every day: For a child, 3 to 4 cups; an expectant mother, 4 cups; a nursing mother, 6 cups; other adults, about 3 cups. (A quart of fluid milk makes 4 cups.)

POTATOES, SWEET POTATOES

Serve 11 or 12 times a week by low-cost plan; 9 or 10 times by moderate-cost plan.

DRY BEANS AND PEAS, NUTS

Including soybeans and soya products, cowpeas, lentils, peanut butter.

Serve 3 or 4 times a week by low-cost plan; 1 or 2 times by a moderate-cost plan.

CITRUS FRUIT, TOMATOES

Oranges, grapefruit, tangerines, other citrus fruit, and tomatoes ... fresh or canned.

Serve at least this often: A child under 4, once a day; an expectant mother, 6 or 7 times a week; a nursing mother, once or twice a day; others in the family, 4 or 5 times a week.

There is more vitamin C in citrus fruit than in tomatoes. So, if you use all tomatoes, use half again as much as the weekly list recommends.

GREEN AND YELLOW VEGETABLES

Many kinds ... such as collards, kale, spinach, other greens, cultivated and wild ... carrots, peas, okra, green asparagus, broccoli, pumpkin, snap beans, yellow squash, green cabbage.

Serve 6 or 7 times a week by low-cost plan; 12 times by moderate-cost plan.

OTHER VEGETABLES, FRUIT

Beets, cauliflower, cucumbers, corn, onions, sauerkraut, turnips, apples, bananas, berries, peaches, rhubarb, dried fruits—all the vegetables and fruits not included in other groups.

Serve 8 or 9 times a week by low-cost plan; 12 or 13 times by moderate cost plan.

EGGS

Serve 4 or 5 a week for each person by low-cost plan; 5 or 6 by moderate-cost plan. Use eggs more liberally if you have your own hens, or when eggs are cheap.

LEAN MEAT, FISH, POULTRY

All kinds, including liver, heart, and other variety meats. Count bacon and salt side in with fats.

Serve 5 or 6 times a week by low-cost plan; 7 or 8 times by moderate-cost plan.

FLOUR, CEREALS

Flour or meal made from any grain—wheat, buckwheat, rye—cooked cereals, ready-to-eat cereals, rice, hominy, noodles, macaroni, breads.

Serve bread at every meal, and also a cereal food once or sometimes twice a day. Whole-grain, enriched, or restored products are best choices.

FATS, OILS

Butter, oleomargarine, salad oils, suet, shortening, lard, bacon, salt side, meat drippings.

"Spread" your fats for cooking and table use, so as to make meals appetizing and give them a stick-to-the-ribs quality. You don't need to figure exact servings.

SUGAR, SYRUPS, PRESERVES

Including any kind of sugar—beet, cane, corn, maple, and brown—molasses, or any kind of syrup or honey, jams and jellies, candy.

One to 12 ounces per person weekly as needed for table and cooking use. You may need more for canning and preserving.

PLAN NUMBER 3

The popular poster depicting the Basic Seven Food Groups, issued by the Nutrition Programs Branch of the War Food Administration, U. S. Department of Agriculture, shows the major food groups from all of which at least one serving should be selected each day. Two or three servings from Groups 3, 4, and 6 would be better.

GROUP ONE—*Green and yellow vegetables (raw, cooked, frozen, canned, or dried)*

Green asparagus, beans—snap, string, and green—broccoli, Chinese cabbage, green celery, chard, collards, green endive, escarole, kale, leaf lettuce, mustard greens, okra, green peas, green peppers, spinach, turnip greens, wild greens, other greens, including salad greens, carrots, pumpkin, yellow squash, sweet potatoes, yams, apricots, and yellow peaches.

GROUP TWO—*Oranges, tomatoes, grapefruit, cabbage*

Fresh or canned: Grapefruit, grapefruit juice, kumquats, lemons, limes, oranges, orange juice, pineapple juice, tangerines, tomatoes, tomato juice, muskmelons, raspberries, strawberries

Raw or slightly cooked: Cabbage, Brussels sprouts, cauliflower, kohlrabi, rutabagas.

GROUP THREE—*Potatoes and other vegetables and fruits (raw, cooked, dried, frozen, or canned)*

White potatoes, artichokes, beets, white celery, cucumbers, eggplant, leeks, head lettuce, fresh lima beans, mushrooms, onions, parsnips, radishes, salsify or oyster plant, sauerkraut, white squash, sweet corn, turnips; apples, avocados, bananas, blackberries, blueberries, cherries, cranberries, currants, dates, figs, gooseberries, grapes, huckleberries, loganberries, mangos, papayas, white peaches, pears, persimmons, pineapples, plums, prunes, quinces, raisins, rhubarb, watermelons, youngberries—also all vegetables and fruits not listed elsewhere.

GROUP FOUR—*Milk and milk products*

Whole milk, skim milk, buttermilk, cultured milk, evaporated milk, condensed milk, dried milk solids—dried whole milk or skim milk—cheese, all kinds including cottage.

GROUP FIVE—*Meat, poultry, fish, or eggs; dried beans or peas; nuts or peanut butter*

Fresh, canned or cured: Beef, veal, lamb, mutton, pork (except bacon and fatback), variety meats—liver, heart, kidney, brains, tongue, sweetbreads, tripe—lunch meats such as bologna, rabbit,

chicken, duck, game, goose, guinea, squab, turkey, fish and shellfish both fresh and salt-water.

Fresh, dried or frozen eggs

Dried: Black-eyed peas, cowpeas, field peas, Great Northern beans, kidney beans, lima beans, navy beans, pinto beans, soybeans, soya flour and grits, other beans and peas, lentils; peanuts, peanut butter, nuts of all kinds.

GROUP SIX—*Bread, flour, and cereals* (*natural whole-grain or enriched or restored*)

Breads: Whole-wheat, enriched white, rolls or biscuits made with whole-wheat or enriched flour, pumpernickel, whole-rye, oatmeal bread

Crackers: Enriched white, whole-grain, soya

Flour: Enriched white, whole-wheat, other whole-grain

Corn Meal: Enriched or whole-grain

Grits: Enriched

Cereals: Whole-wheat, rolled oats, brown rice, other cereals if whole-grain or restored

GROUP SEVEN—Butter and fortified margarine with added vitamin A

ENERGY FOODS—These foods give chiefly energy. They should be eaten in addition to the basic seven, not in place of them.

Bacon, drippings, lard, mutton fat, salt pork, fatback, suet, poultry fat, salad oils, salad dressings, honey, preserves, jams, jellies, cane syrup, corn syrup, maple syrup, molasses (contains iron) sorghum (contains iron), cornstarch, noodles, macaroni, spaghetti, white corn meal, hominy grits, white rice, unenriched crackers, white bread, rolls, white flour; sugar, candy, cakes, cookies, pastries, other sweets.

QUESTIONS FOR STUDY

1. How much protein should your own diet furnish?
2. How much milk should a child receive daily? An adult? Why?
3. What are vitamins? How many are known?
4. What is the function of each vitamin?
5. What is the minimum and what the optimum daily allowance of vitamin A? Vitamin B_1? Vitamin C? Vitamin D? Riboflavin?
6. How can one be sure of an adequate supply of vitamins in the diet?
7. How do pregnancy and lactation affect the vitamin requirement?

PART TWO

DIET THERAPY

5.
BASIC HOSPITAL DIETS

The same knowledge is required in planning diets for the sick as for the well—a knowledge of the nutritional requirements of the body and the quantities of the various nutritive essentials present in the various foods. Therapeutic diets, or diets designed to meet special needs of the body necessitated by some abnormal condition, should always be regarded as modifications of the normal diet. The basic requirements for an adequate diet must not be violated even when illness makes certain changes in the diet necessary. No sick person should be given, longer than is absolutely necessary, a diet deficient in any nutritional essential.

Since diet is of paramount importance in the treatment of many diseases, the ability to arrange and administer diets to the satisfaction of physician and patient becomes an increasingly essential part of the nurse's education. She should know, not only how to choose suitable foods for her patient and fit them into a daily menu, but also how to prepare them in a way to make them palatable, appetizing, and nourishing. Every individual has idiosyncrasies of diet; and sickness often emphasizes them. The problem of tempting the palate falls to the nurse; and she must employ all her skill and intuition to please the patient while still carrying out the doctor's orders.

A nurse should know the different types of diet in general use in hospitals—the foods included and why they are included, as well as why other foods are excluded. She should be able, if necessary, to calculate the quantity of food required and apportion it through the day, in three regular feedings or in smaller amounts more often, as the case requires.

Diets in daily use in hospitals and designed to meet normal and abnormal needs are usually referred to as *Standard Hospital Diets.* Certain other diets for special pathological conditions, and which may be served to the patient upon the physician's order, are described as *Special Hospital Diets.*[1]

[1] See also Table 28, Appendix.

STANDARD HOSPITAL DIETS

These include the Full or House Diet, the Light, Soft, and Liquid Diets.

FULL OR HOUSE DIET

The Full or House Diet is used for patients more or less confined by incapacities, such as injuries from accidents and by minor illnesses. The foundation plan for this diet is the same as for the normal diet[2] except as slight modifications are made to meet individual needs.

The choice of foods may be rather wide, less expensive foods being used when there is a question of cost. Since patients are usually relatively inactive, very rich foods or those liable to cause digestive disturbances should be avoided. Vegetables and fruits should be used liberally, and the protein allowance should be adequate but not in excess. The caloric value should be checked to keep it within the requirement for sedentary occupation. Laxative foods may be included in moderation or as the need for them is indicated.

Foods allowed[3]

Soups Any kind except those made with dried beans, dried peas and onions.

Meat, fish and poultry Any except fried.

Eggs Prepared any way except fried.

Milk and milk products Milk in all forms, cream, butter and mild cheese.

Vegetables Any kind except strongly flavored, dried beans and other gas-forming vegetables.

Fruits Any kind, raw, dried, canned, or cooked. One or more servings of citrus fruit daily.

Salads Any raw or cooked fruits or vegetables except those not allowed. Gelatin, avocado, egg and cheese. Served with salad dressings.

Cereals Any kind, dry or cooked, except bran products, preferably whole grain or enriched. Macaroni, spaghetti and noodles.

Breads Any kind except bran bread, preferably whole-grain or enriched.

Desserts Any kind except rich pastries and steamed puddings.

Concentrated sweets A little of sugar, jelly, jam, syrup, honey.

[2] See page 115.

[3] *Compilation of Diets,* California Dietetic Association, Institute Press, Los Angeles, Calif., 1942.

Concentrated fats Butter and cream and other vegetable or animal fats, including bacon.
Nuts Any in small amounts.
Beverages Tea, coffee, or coffee substitute.

SAMPLE MENU—FULL OR HOUSE DIET [4]

For 2600 Calories a Day: Approximate value—protein, 98 grams; fat, 102 grams; carbohydrate, 309 grams.

MEAL PLAN		AMOUNT Grams	Measure
Breakfast:			
Fruit juice	Orange juice	200	6⅔ oz.
Fruit	Cantaloupe	150	⅓ melon
Cereal	Whole-wheat, cooked	120	⅔ cup
Cream 20%	Cream	90	3 oz.
Egg or bacon	Soft-boiled egg	50	1 egg
Bread	Whole-wheat toast	60	2 slices
Butter	Butter	10	1 square
Cream	Cream	30	2 tbsp.
Sugar or jelly	Sugar	20	4 tsp.
Hot beverage	Coffee		
Noon Meal:			
Soup	Cream of celery soup	150	5 oz.
Cheese, egg, or meat	Spinach & cheese loaf	150	1 slice
Vegetable	Banana squash	100	3 tbsp.
Salad	Sliced tomato	130	1 medium
Fruit or dessert	Fresh peaches	140	1 medium
	Sugar	10	2 tsp.
Bread	Whole-wheat	30	1 slice
Butter	Butter	10	1 square
Milk or buttermilk	Milk	240	8 oz.
Evening meal:			
Fruit cup or salad	Mixed fruit cocktail	120	½ cup
Meat	Roast lamb	100	3⅓ oz.
	Mint jelly	15	1 tsp.
Potatoes	Mashed potatoes	90	3 tbsp.
Vegetables	Diced carrots	100	3 tbsp.
	Asparagus tips	100	6-8 stalks
Dessert	Pineapple sherbert	120	½ cup
	Plain cookies	15	2 cookies
Bread	Roll	30	1 roll
Butter	Butter	10	1 square
Milk	Milk	240	8 oz.

[4] *Ibid.*

LIGHT OR CONVALESCENT DIET

As the name indicates, this diet is given when a patient is recovering from illness. It is preliminary to a regular normal diet.

A simple mixed diet is suitable for convalescence. Foods recognized as difficult of digestion should be avoided and emphasis laid on milk, eggs, toast, and well-cooked cereals. Mild fruits and well-cooked vegetables may be added cautiously; and tender meat, chicken, or fish about once a day. The fuel value should be liberal, probably 2200 to 2500 calories per day for a person weighing about 150 pounds, with 80 to 100 grams protein, 300 grams carbohydrate, and 80 to 90 grams fat.

Foods allowed [5]

Soups Any kind except those made with dried beans, dried peas, and onions.

Meat, Fish and Poultry Broiled or baked lamb chops, chicken, turkey, fish, rabbit, liver, sweetbreads, and scraped or ground beef.

Eggs In any form except fried.

Milk and Milk Products Milk in all forms, cream, butter, and mild cheese.

Vegetables Any cooked, except strongly flavored, dried beans, and other gas-forming vegetables. Raw tomatoes and tender hearts of celery.

Fruits Any cooked fruit. Raw citrus fruits (one or more servings), ripe banana, pears, peaches, and strawberries.

Salads Any made from the fruits and vegetables allowed. Avocado, olives, gelatin, and cheese. Served with salad dressings.

Cereals Any kind except bran products, preferably cooked whole-grain or enriched. Also plainly cooked macaroni, spaghetti, and noodles.

Breads Any kind except bran products, preferably whole-grain or enriched.

Desserts Any kind except rich pastries and steamed puddings.

Concentrated sweets A small amount of sugar, fruit jams, and jellies, honey, and syrup.

Concentrated fats Butter and cream and other vegetable or animal fats, including bacon.

Beverages Tea, coffee, or coffee substitute.

[5] *Ibid.*

SAMPLE MENU—LIGHT OR CONVALESCENT DIET

For 2000 Calories a Day: Approximate value—protein, 70 grams; fat, 100 grams; carbohydrate, 205 grams

MEAL PLAN	AMOUNT	
Breakfast:	*Grams*	*Measure*
½ orange	100	½ med.
Shredded wheat	30	1 biscuit
Milk	100	⅓ cup
Toast	15	1 slice
Butter	7	½ tbsp.
Coffee	. . .	1 cup
Cream, thin	30	2 tbsp.
Sugar	10	2 tsp.
10:30 A.M.:		
Milk	150	⅝ cup
Noon Meal:		
Cream of potato soup	180	⅝ cup
Minced chicken	90	⅜ cup
Rice	100	⅜ cup
Buttered carrots	100	¾ cup
Whole-wheat bread	40	2 slices
Butter	7	½ tbsp.
Vanilla ice cream	100	⅜ cup
3:30 P.M.:		
Orangeade ½ cup juice ½ cup water 1 tsp. sugar	250	1 cup
Evening Meal:		
Lamb chop	50	1 small
Creamed peas	100	½ cup
Bread	20	1 slice
Butter	7	½ tbsp.
Chocolate blanc mange	80	⅜ cup

SAMPLE MENU—LIGHT OR CONVALESCENT DIET—Continued

MEAL PLAN	AMOUNT	
Evening Meal:	*Grams*	*Measure*
Whipped cream	25	1 tbsp.
Tea	...	1 cup
Sugar	10	2 tsp.
9:30 P.M.:		
Iced cocoa	270	1 cup

SAMPLE MENU—MEDIUM CONVALESCENT DIET

For 2600 Calories a Day: Approximate value—protein, 90 grams; fat, 120 grams; carbohydrate, 290 grams

MEAL PLAN	AMOUNT	
Breakfast:	*Grams*	*Measure*
Oatmeal	180	2/3 cup
Milk	100	1/2 cup
Toast	30	2 slices
Butter	13	1 tbsp.
Coffee	...	1 cup
Cream, thin, 20%	30	2 tbsp.
Sugar	10	2 tsp.
10:30 A.M.:		
Eggnog	220	7/8 cup
Crackers, soda	25	4
Noon Meal:		
Cream of green pea soup, strained	140	1/2 cup
White bread	40	2 slices
Butter	13	1 tbsp.
Sirloin steak broiled, lean,	70 3½" x 1½" x ¾"	1 slice
Baked potato	150	1 med.
Spinach, buttered	120	1/2 cup
Apple tapioca	90	3/8 cup

SAMPLE MENU—MEDIUM CONVALESCENT DIET—Continued

MEAL PLAN	AMOUNT	
Noon Meal:	*Grams*	*Measure*
3:30 P.M.:		
Orangeade	250	1 cup
½ cup juice		
½ cup water		
1 tsp. sugar		
Crackers, soda	25	4
Evening Meal:		
Broiled halibut steak	85 4½″ x 2¼″ x 2″	1 slice
Tomato sauce	60	4 tbsp.
Toast	30	2 slices
Butter	13	1 tbsp.
Tea	. . .	1 cup
Sugar	10	2 tsp.
Rice pudding	100	⅜ cup
Thin cream, 20%	60	¼ cup
9:30 P.M.:		
Milk	150	⅝ cup
Crackers, soda	25	4

SAMPLE MENU—FULL CONVALESCENT DIET

For 3000 Calories a Day: Approximate value—protein, 110 grams; fat, 140 grams; carbohydrate, 325 grams

MEAL PLAN	AMOUNT	
Breakfast:	*Grams*	*Measure*
Farina	180	⅔ cup
Milk	100	⅓ cup
Toast	30	2 slices
Butter	13	1 tbsp.
Egg, coddled	50	1 egg
Coffee	. . .	1 cup
Cream, thin, 20%	60	¼ cup
Sugar	10	2 tsp.

SAMPLE MENU—FULL CONVALESCENT DIET—Continued

MEAL PLAN	AMOUNT Grams	Measure
10:30 A.M.:		
Orangeade	240	1 cup
½ cup juice		
½ cup water		
2 tsp. sugar		
Crackers	40	4
Noon Meal:		
Cream of corn soup	240	¾ cup
Whole-wheat bread	40	2 slices
Butter	13	1 tbsp.
Baked ham, lean	60	1 slice
	4¾″ x 6″ x ⅛″	
Mashed potato	150	¾ cup
Cauliflower, buttered	100	½ cup
Prune soufflé	120	⅝ cup
Custard sauce	70	⅓ cup
3:30 P.M.:		
Iced cocoa	270	1 cup
Crackers	30	4
Evening Meal:		
Salmon	100	½ cup
White sauce	90	⅜ cup
Toast	30	2 slices
Butter	13	1 tbsp.
Tea	...	1 cup
Sugar	10	2 tsp.
Tapioca custard	120	½ cup
9:30 P.M.:		
Eggnog	260	1 cup

SOFT OR SEMISOLID DIET

This diet differs from a full liquid diet in that it includes a number of foods that are semisolid and usually has a high caloric value (2000-2400 calories). It must be simple, well cooked, attractively served, and easy of digestion. It is a step in advance of a liquid diet, but contains less variety and less solid food than the convalescent diet. It may include specially prepared meat or fish and vegetables. During the use of this diet, the patient's appetite may usually be depended upon to regulate quantity.

Foods allowed [6]

Soups Clear soups, strained vegetable soup, and any cream soup except those made with dried beans, peas, and onions.

Meat, fish and poultry Scraped beef. fish, white meat of chicken and turkey, and sweetbreads.

Eggs In any form except fried.

Milk and milk products Milk in all forms, butter, cream, cottage cheese, and cream cheese.

Vegetables Baked or mashed potato and any mildly flavored sieved vegetables.

Fruits Strained fruit juices and any sieved cooked fruit. Canned pears, peaches, and peeled apricots may often be used whole.

Salads Avocado, fruit, gelatin, and cottage cheese.

Cereals All finely milled cooked cereals, preferably enriched. Strained oatmeal and plainly cooked macaroni, spaghetti, noodles, and rice.

Breads White bread or toast, preferably enriched. Uneeda biscuits and soda crackers.

Desserts Milk puddings, plain gelatin desserts, fruit whips, plain ice cream and sherberts, sponge cake, angel food cake, and plain cookies.

Concentrated sweets A small amount of sugar, fruit jellies, honey, and syrup.

Concentrated fats Butter, cream, and salad oil.

Beverages Tea, coffee, or coffee substitute. Strained fruit and vegetable juices.

[6] *Ibid.*

SAMPLE MENU—SOFT OR SEMISOLID DIET [7]

For 2400 Calories a Day: Approximate value—protein, 98 grams; fat, 104 grams; carbohydrate, 272 grams

MEAL PLAN		AMOUNT Grams	Measure
Breakfast:			
Strained fruit juice or sieved fruits	Strained orange juice	200	6⅔ oz.
Finely milled cereal	Cream of Wheat	120	⅔ cup.
Cream 20%	Cream	60	2 oz.
Egg	Poached egg	50	1 egg
White toast	White toast (enriched)	30	1 slice
Butter	Butter	10	1 square
Cream	Cream	30	2 tbsp.
Sugar	Sugar	10	2 tsp.
Hot beverage	Coffee		
Midmorning Feeding:	Tomato juice	200	6⅔ oz.
Noon Meal:			
Milk soup	Cream of corn soup	150	5 oz.
Cheese or egg	Cheese soufflé	50	½ cup
Vegetables	Sieved spinach	100	½ cup
	Sieved carrots	100	½ cup
Fruit	Applesauce	125	½ cup
White bread	Melba toast	5	2 slices
Butter	Butter	5	½ square
Milk	Milk	240	½ pint
Midafternoon Feeding:	Pineapple juice	200	6⅔ oz.
Evening Meal:			
Meat	Turkey (white meat)	60	2 oz.
Potato or rice	Mashed potatoes	90	3 tbsp.
Vegetables	Sieved tomatoes	130	¾ cup
	Sieved string beans	100	½ cup
Dessert	Lemon sherbet	90	⅛ quart
White bread	White toast (enriched)	30	1 slice
Butter	Butter	10	1 square
Milk	Milk	240	½ pint
Night Feeding:	Cocoa	150	5 oz.

[7] *Ibid.*

LIQUID DIETS

Liquid diets consist of liquid foods only and represent what may be well to give during the first stages of any acute illness when one wishes to rest the digestive tract without withholding food altogether.

Feedings may be given every two, three, or four hours, from 6 A.M. to 8 P.M., with two night feedings if the patient is awake.

Foods allowed [8]

Soups Any clear soup, strained vegetable soup, or milk soup made with sieved vegetables.
Eggs Well-beaten eggs in beverages or in desserts.
Milk All types of milk drinks and cream.
Vegetables Strained vegetable juices and small amounts sieved in cream soup.
Fruits Strained fruit juices.
Cereals Thin gruels and cereal waters.
Desserts Plain ice cream and sherberts made from strained fruit juices. Custards, junket, and plain gelatin desserts.
Concentrated sweets Small amount of sugar.
Concentrated fats Cream.
Beverages Tea, coffee, or coffee substitute.

FULL-RATION LIQUID DIET

(1900-2000 Calories)

This gives the full requirement for an adult weighing approximately 150 pounds and confined to bed. It may, if necessary, be used over long periods. It also serves as a preparation for semisolid and convalescent diets.

SAMPLE MENU—FULL-RATION LIQUID DIET [9]

For 2000 Calories a Day: Approximate value—protein, 64 grams; fat, 81 grams; carbohydrate, 232 grams

MEAL PLAN		AMOUNT	
Breakfast:		*Grams*	*Measure*
Fruit juice	Strained orange juice	200	6⅔ oz.
Gruel with milk	Oatmeal milk gruel	180	6 oz.

[8] *Ibid.*
[9] *Ibid.*

SAMPLE MENU—FULL-RATION LIQUID DIET—Continued

MEAL PLAN		AMOUNT Grams	Measure
Breakfast:			
Cream 20%	Cream	60	4 tbsp.
Sugar	Sugar	15	1 tbsp.
Hot beverage	Coffee		
Midmorning Feeding:	Eggnog		
	Milk	150	5 oz.
	Egg	50	1 egg
	Sugar	15	1 tbsp.
Noon Meal:			
Milk soup	Cream of tomato	150	5 oz.
Dessert	Lemon milk sherbet	70	¼ cup
Beverage	Milk	240	8 oz.
Afternoon Feeding:			
2 P.M.	Pineapple juice	200	6⅔ oz.
4 P.M.	Raspberry sherbet	70	¼ cup
Evening Meal:			
Milk soup	Cream of corn	150	5 oz.
Dessert	Custard	100	3⅓ oz.
Fruit juice	Grapejuice	100	3⅓ oz.
Beverage	Milk	240	8 oz.
Night Feeding:	Warm milk	240	8 oz.

HALF-RATION LIQUID DIET

(800-1000 Calories)

This is intended to prepare the patient for the full fluid regimen. The balance of the daily requirement must be borrowed from the patient's own tissues. The following foods are allowed:

	AMOUNT	CALORIES
Whole milk	1½ pints	498
Meat broth	1½ pints	111
Cereal flour gruel	1 tbsp. barley	60
Sugar	4 tbsp.	240
Egg white	2 tbsp.	26
Lemon juice	4 tbsp.	
Coffee, tea, Vichy water (no fuel value)		—
Total		935

Calories, 935: protein, 42 grams; fat, 35 grams; carbohydrate, 112 grams.

SAMPLE MENU—HALF-RATION LIQUID DIET

8 A.M.	Milk	10 ounces, 300 c.c.	200
10 A.M.	Milk and strained barley water, equal parts	10 ounces, 300 c.c.	120
12 M.	Bouillon with the whites of 2 eggs	10 ounces, 300 c.c.	50
2 P.M.	Lemonade with 2 tablespoons sugar	10 ounces, 300 c.c.	120
4 P.M.	Milk	10 ounces, 300 c.c.	200
6 P.M.	Bouillon with the whites of 2 eggs	10 ounces, 300 c.c.	50
8 P.M.	Whey	10 ounces, 300 c.c.	70
10 P.M.	Lemonade with 2 tablespoons sugar	10 ounces, 300 c.c.	120
	Total		930

Calories, 930: protein, 51 grams; fat, 30 grams; carbohydrate, 114 grams. One quart of water should be taken in addition in 24 hours.

CLEAR LIQUID DIET

(800–1000 Calories)

This diet is designed to eliminate the use of milk and milk products and egg yolks.

Foods allowed [10]

Soups Any clear soup, beef tea, and strained vegetable soup.
Eggs Egg white well beaten.
Fruits Strained fruit juices. Use citrus fruit juice freely.
Vegetables Strained vegetable juices.
Cereals Cereal water and thin gruel.
Desserts Fruit ices made from strained fruit juices. Clear gelatin desserts.
Concentrated sweets Sugar in small amounts. Use lactose or malt sugars freely.
Beverages Tea, coffee, or coffee substitute.
Miscellaneous Warm liquid gelatin may be used to increase the protein.

[10] *Ibid.*

SAMPLE MENU—CLEAR LIQUID DIET

For 980 Calories a Day: Approximate value—protein, 25 grams; fat, 0 grams; carbohydrate, 220 grams

MEAL PLAN		AMOUNT Grams	Measure
Breakfast:			
Fruit juice	Strained orange juice	200	6⅔ oz.
Cereal water	Oatmeal water	180	6 oz.
Sugar	Sugar	10	2 tsp.
Hot beverage	Coffee		
Morning Feedings:			
9:00 A.M.	Tomato juice	200	6⅔ oz.
10:30 A.M.	Grapefruit juice	200	6⅔ oz.
Noon Meal:			
Clear broth	Chicken broth	150	5 oz.
Dessert	Lemon water ice	70	¼ cup
Fruit juice	Grapejuice	120	4 oz.
Hot beverage	Tea		
	Lemon	5	1 tsp.
	Sugar	5	1 tsp.
Afternoon Feedings:			
2:00 P.M.	Raspberry gelatin	100	3⅓ oz.
4:00 P.M.	Apple juice	200	6⅔ oz.
Evening Meal:			
Clear broth	Beef broth	150	5 oz.
Dessert	Cherry gelatin	100	3⅓ oz.
Fruit juice	Prune juice	120	4 oz.
Hot beverage	Tea		
	Lemon	5	1 tsp.
	Sugar	5	1 tsp.
Night Feeding:	Strained orange juice	200	6⅔ oz.

LOW-CALORIE LIQUID DIET

(100-200 Calories)

This diet consists of clear meat soups, thin gruels, diluted fruit juices slightly sweetened, along with nonnutritious drinks such as plain tea and coffee. These foods are in reality not given for their very slight nutritive value, but because they are palatable and at the same time enable the stomach to rest for a day or two. Thus the patient receives a

liberal daily supply of water (2 or 3 pints) in a bland and agreeable form.

SAMPLE MENU—LOW-CALORIE LIQUID DIET

			Calories
8 A.M.	Tea or coffee, with 1 tbsp. sugar	1 or 2 cups, 250–500 c.c.	17 –17
12 M.	Thin barley gruel with 1 tbsp. crushed barley	10 oz., 300 c.c.	50 –50
4 P.M.	Bouillon	1 or 2 cups, 250–500 c.c.	25 –50
8 P.M.	Lemonade, with 1 tbsp. sugar	1 or 2 cups, 250–500 c.c.	60–120
Total			152–237

Calories, 237: protein, 12 grams; fat, 0 grams; carbohydrate, 47 grams. Two quarts of plain or carbonated water should be consumed in addition in every 24 hours.

RESTRICTED LIQUID DIET
(Nonnutritive)

8 A.M.	Tea or coffee,	1 or 2 cups	250–500 c.c.
12 M.	Bouillon,	1 or 2 cups	250–500 c.c.
4 P.M.	Tea or coffee,	1 or 2 cups	250–500 c.c.
8 P.M.	Bouillon,	1 or 2 cups	250–500 c.c.

Two quarts of plain or carbonated water should be consumed in addition in every 24 hours.

SPECIAL DIETS

These are diets designed to meet special mechanical or chemical body needs.[11]

1. **High-calorie diet** This diet is of higher caloric value than the individual to whom it is given would normally require. It is given to meet a need for energy caused by the more rapid metabolism which accompanies certain diseases, especially fevers. It consists usually of the liquid or the soft diet with the caloric value increased by the addition of carbohydrates and fats, chiefly in the form of milk, sugar, and cream. For details see Chapter 6, page 149.

2. **Low-protein diet** As the name signifies, this diet is made up of foods which furnish only small amounts of protein. It consists largely of carbohydrates and fats and is used in cases of chronic nephritis and intestinal disorders when putrefaction is present.

[11] See Index under "Diets, hospital" for examples of the following diets and various combinations of these diets.

3. **High-carbohydrate diet** In this diet the protein is kept rather low, but the percentage of carbohydrate is above normal. Such a diet is used in cases of intestinal putrefaction or for building weight.

4. **Low-carbohydrate diet** In this diet starches and sugars are restricted. It is used in cases where carbohydrates are poorly metabolized, as in diabetes mellitus and in cases of obesity.

5. **High-fat diet** Such a diet is usually of high caloric value and is used for fattening, or when energy requirement is increased, or for treating chronic constipation when roughage diet is not advisable.

6. **Low-fat diet** In this diet the fat content is restricted. It excludes fat meats, gravies, butter, cream, oil dressings, pastries, and pie and is used in obesity or any form of acidosis or when normal secretion of bile is prevented by disturbances of the liver, gallbladder, or bile ducts.

7. **Low-purin diets** These diets exclude purin-bearing foods such as meats, fish, and glandular tissues—liver, sweetbread, and kidney—whole-grain products, legumes, and sometimes tea and coffee. If meat or fish is given, it should be boiled rather than roasted or broiled. This diet is used in cases of gout, chronic nephritis, arthritis, and sometimes cancer.

8. **Salt-poor diet** It is impossible to arrange an absolutely salt-free diet. A salt-poor diet consists of foods containing a very small percentage of sodium chloride with no salt added in their preparation. Bread and butter, with no added salt, are used. This diet is beneficial in the treatment of edema in various forms, especially that resulting from renal disorders. A modified salt-poor diet is recommended in cases of chronic nephritis and gastric hyperacidity.

9. **Base-forming diets** These diets are rich in basic salts and consist largely of green vegetables, fruits, milk, and milk products. They are used in conditions of acidosis, as in cases of chronic nephritis, diabetes mellitus, hypertension or high blood pressure, and hardening of the arteries.

10. **Diets rich in mineral salts** These diets contain more than the normal amount of iron and calcium. They are made up of milk, eggs, vegetables, fruits, whole grains, dried fruits, meat, and nuts. Milk is especially rich in calcium. Iron-rich diets are used in the treatment of various forms of anemia.[12] Calcium-rich diets are used in tuberculosis.

[12] For a diet high in iron and in protein from glandular organs, see the anemia diet, pages 300-309.

Calcium and iron are both of special importance in the feeding of children.

11. **Roughage diet** This includes generous amounts of fresh and dried fruits, green vegetables, salad plants, whole grains for bread and breakfast cereals, molasses, and plenty of water. The diet is recommended to counteract constipation.

12. **Nonroughage (smooth or bland) diet** This consists of foods almost free from indigestible material. It must be nonirritating, nonstimulating, and easily digested so that there will be little residue. Such a diet may be given in cases of chronic diarrhea or as an intestinal test diet.

QUESTIONS FOR STUDY

1. What principles govern diet for the sick?
2. Describe liquid, soft, and convalescent diets. Under what conditions are they given?
3. Discuss the advantages and disadvantages of an exclusive milk diet.
4. What conditions call for a high-calorie diet?
5. How may the caloric value of a diet be increased without increasing protein?
6. What conditions call for a low-protein diet?
7. When would a low-carbohydrate diet be given?
8. Under what conditions should purins be excluded or restricted?
9. What is meant by a salt-poor diet?
10. When should salt-poor diets be given?
11. What are the benefits from a roughage diet?
12. What foods should be included in such a diet?
13. What conditions call for a smooth or bland diet?

6.

INFECTIONS AND FEVERS [1]

The dietetic treatment of diseases characterized by fever has undergone revolutionary changes within the last 30 years. For more than 2000 years, patients with fever were practically starved and often deprived of water. About 1830 Graves recommended a diet furnishing some 300 calories. The elder Flint popularized the milk diet, containing from 1000 to 1200 calories, about 1870. From the '90's on, the so-called liberal diets were advocated in Russia, England, and America. These diets contained, however, too much protein and too little fuel.

In 1907 Coleman and Shaffer began a study of metabolism in typhoid fever, which served as the foundation for the more extended studies of Coleman and DuBois. Although these investigations were confined to typhoid fever, the facts discovered are believed to be generally applicable to many other febrile diseases.

Metabolism in fever All the processes of metabolism are increased in fevers—the fires of the body burn under forced draught; and to meet this condition a patient with fever requires more, rather than less, food.

The investigations of Coleman and DuBois have brought out the fact that the fuel of choice for the production of increased energy is carbohydrate, and that the fever diet should preferably contain a predominant amount of this nutrient. Fat also is useful, however, and may be increased to large amounts when carbohydrate cannot be given freely.

When a patient with fever does not receive sufficient food, the food reserves of the body are consumed to supply the deficit. If the fever is high, the carbohydrate reserve is quickly exhausted—probably within a few hours. Thereafter the fat and the muscles are called upon to meet the extra demands. The extent to which the muscles become involved

[1] This chapter was prepared by Dr. Warren Coleman, professor of clinical medicine, University of Georgia School of Medicine; professor emeritus of clinical medicine, New York University College of Medicine. Approved by Dr. Coleman, 1944.

is indicated by the increase of the nitrogen output in the urine. Formerly it was not thought possible to protect the tissues of the body completely during fever by means of diet; but the studies of Shaffer and Coleman have proved that the patient can be brought into complete nitrogen equilibrium.

The total food required Broadly speaking, the diet should be arranged with the view of keeping the patient in complete metabolic equilibrium—that is, equilibrium of energy and of substance. If the diet should fail in either of these respects, it cannot be considered adequate.

The increase in metabolism, probably characteristic of all fevers, varies in extent; but for practical purposes it may be said that the higher the temperature, the more active the metabolism. This means, contrary to the popular conception, that the higher the fever, the greater is the need for food. With temperatures under 103° F., the average increase in metabolism will probably not exceed 30 per cent or 40 per cent; with higher temperatures, the increase may amount to 50 per cent or more.[2]

While it might be thought that a diet which furnished 50 per cent more energy than a patient requires when he is well would cover his needs during fever, some typhoid patients continue to lose nitrogen, chiefly from the muscles, until the energy value of the diet reaches 100 per cent over the normal.

In other words, some patients require twice as much food during a fever as when they are well.

Expressed in terms of energy, adult fever patients require from 3000 to 5000 or even 6000 calories a day.

The carbohydrate and fat requirement Since carbohydrate and fat are the chief energy-producers in both fever and health, these nutrients should predominate in the diet.

Ordinarily the carbohydrate should furnish from one-half to two-thirds—preferably the latter—of the energy of the diet; but, when a patient cannot take so much carbohydrate, the fat should be proportionately increased.

An average daily carbohydrate allowance would be from 400 to 500 gm. It should not be allowed to fall below 50 gm.; on the other hand, it may be raised to 800 gm.

[2] It should not be forgotten, however, that special conditions may exist or arise, such as nausea and vomiting, intestinal hemorrhage in typhoid fever, or marked abdominal distention in pneumonia, which make it unwise to attempt to give the patient all the food he requires.

An average daily fat allowance would be 100 to 150 gm., which may be increased to 300 gm. in exceptional instances.

The protein requirement The amount of protein needed in fevers is only slightly greater than that required in health. Stating this fact differently, the protein of the diet cannot be reduced as low in fever as in health without loss of body protein.

The daily amount of protein in the fever diet should not be allowed to fall below 60 gm., nor does any benefit come from increasing it beyond 90 gm. In general, a diet which furnishes sufficient energy will almost certainly contain enough protein.

Method of calculating food requirements The food requirement of a patient may be calculated from his body weight or from his surface area. That is, we may calculate the daily calorie requirement per kilogram of body weight or the hourly calorie requirement per square meter of surface. DuBois, who has published a "height-weight" chart for estimating surface area, advises this latter method as the more accurate.

Starting with the basal caloric requirement, which for the average healthy man is 26 calories per kilogram of body weight per day, or 40 calories per square meter of body surface per hour, and allowing a 50 per cent increase to cover the extra heat production during fever, the caloric requirement will be about 40 calories per kilogram per day, or 60 calories per square meter of body surface per hour. In addition to this, an extra supply of energy amounting to from 50 per cent to 100 per cent of the total heat production is required to protect the body protein. Therefore the patient's energy requirement would be from 60 to 80 calories per kilogram of body weight per day, or from 90 to 120 calories per square meter of surface per hour.

For an adult whose weight is 70 kilograms, this will mean a diet furnishing as high as 4000 calories per day, or, in some cases of typhoid fever, 5000 or even 6000 calories daily.

Administration of diet While the patient's food requirements may be as stated above, it does not follow that a diet so arranged can always be given. The individual's ability to utilize it must always be considered. It is the patient, not the disease, which must be fed. Careful attention should be given to a patient's preferences for food and to his peculiar dislikes; and these will probably be more pronounced in sickness than in health. If the appetite is sluggish, the nurse may be able to do much toward inducing a willingness to eat by talking with the patient about the effect his eating will have on his recovery.

Unless the patient really wants to eat, which is unusual, it is better to give comparatively small amounts during the first few days. Whether it should be liquid or not depends on the patient's attitude of mind. If he is able to masticate it thoroughly, there is no objection to carefully selected solid food. The amount and variety of food should be increased as the patient's appetite and his ability to digest it may indicate.

Cleansing the mouth is important in any febrile condition. In fevers the mouth is likely to acquire a disagreeable taste which may still further lessen the patient's desire for food.

Foods allowed Foods constituting a high-calorie diet may be chosen from the following:

1. Milk 2. Eggs 3. Bread 4. Cereals 5. Potatoes 6. Rice 7. Apples 8. Oranges

These may be reinforced by such concentrated foods as butter, cream, sugar, and milk sugar.

Milk sugar is especially adapted to the purpose because, on account of its lack of sweetness, it can be added to foods in considerable amounts without appreciably affecting their taste.

Milk is always a staple article of diet for fever patients. It may be modified in many ways to increase its digestibility, such as diluting it with water, lime water, cereal water, or effervescing water; by peptonizing it; or by employing ferments such as are used in making zoolak, kumyss, and kefir. Its flavor may be disguised by the use of tea, coffee, or cocoa. Milk is always more readily digested when taken with crackers or toast.

Well-cooked cereals and gruels play an important part in these diets. They are nutritious in themselves, and they are an acceptable means of adding cream and sugar.

Eggs may be used, either mixed raw with milk and other liquids, in soups or beverages, or served soft-cooked or in custards. The number of eggs should rarely exceed 6 a day.

Broths and clear soups are valuable for variety and for stimulation of gastric digestion. If thickened with some farinaceous substance such as tapioca, sago, or fine dry bread or cracker crumbs, they are of material nutritive value.

Plenty of water is recommended and also acid drinks, not only because they are refreshing, relieve thirst, and aid in elimination of waste, but also because they may be made the vehicle for albumin and lactose.

Although some authorities recommend a very high daily intake water, Coleman does not believe in the popular plan of forcing wa Enough should be given, however, to keep the urine around 3 t pints.

Cautions If the disease is complicated by digestive disturbances, if the digestion becomes disordered, the diet must be rearranged as quantity and kind to overcome the difficulty.

The disturbances most often occurring with this diet are naus vomiting, tympanites, and diarrhea. The mixtures of milk, cream, l tose, and egg may be too rich; and the development of such digest troubles depends upon the patient's tolerance for these foods.

Large amounts of milk sugar sometimes cause vomiting. If this curs, the diet should be made very simple, possibly all food withh for a few hours, and the diet continued with smaller amounts.

Unless abdominal distention from air or gas (tympanites) cau discomfort, it may be ignored; but if it becomes distressing the d should be altered. Eggs may be the disturbing element, sometin cream, but more often it is lactose.

Diarrhea is most likely to be due to excess of cream. It can usua be controlled by changing the diet. Reducing the cream should be tr first. If this is not effective, the amount of lactose may be lessened a cream increased. Many cases have been controlled in this way.

Diet in convalescence With the more liberal diet now used dur the febrile period, the diet during convalescence does not differ fr the fever diet so much as formerly. The same type of food is used, w the gradual addition of more solid food as the patient seems able care for it. Meat is not advised, however, until late in convalescence

TYPHOID FEVER

By means of numerous studies made upon typhoid patients in calorimeter, it has been established beyond doubt that the high-cal diet is an essential part of the treatment of this disease. With a sufficiently rich in fats and carbohydrates to cover the energy requ ments, the patient is able to maintain almost normal weight and is ter able to withstand relapse if it should occur. Nor does this diet m relapse more liable. The period of convalescence is greatly shorte and the patient escapes the intense hunger that used to follow the vation treatment.

COLEMAN'S HIGH-CALORIE FOOD LIST [3]

FOOD	AMOUNT	CALORIES
Apple sauce [4]	1 oz.	30
Apple, pared and cored	1 medium	about 75
Bread, average slice	30 grams	80
Butter, 1 pat	13 grams	about 100
Cocoa, 1 rounded teaspoon	5 grams	25
Crackers, soda, 1	9 grams	36
Uneeda biscuit, 1	6 grams	25
Cream, 20 per cent [5]	1 oz. (30 c.c.)	60
Egg	1 average size	75
Egg white	white of 1 egg	15
Egg yolk	yolk of 1 egg	60
Farina, cooked	1 heaping tbsp.	25–30
Lactose (milk sugar)	1 heaping tsp.	40
Lactose (milk sugar)	1 measured oz., 30 grams	72
Lemon juice	1 oz.	12
Milk, whole	1 oz.	20
Orange	1 large	100
Orange juice	1 oz.	15
Oatmeal, rolled oats, cooked	1 heaping tbsp.	36
Potato	1 medium	100
Rice, boiled	1 heaping tbsp.	about 60
Sugar, cane	1 heaping tsp.	40
Sugar, cane	1 level tbsp.	56
Toast	average slice	80

COLEMAN'S HIGH-CALORIE DIET [6]

The following food combinations and menus will be found of assistance in administering the high-calorie diet: [7]

FOR 1000 CALORIES A DAY

	CALORIES		CALORIES
Milk, 1 quart (1000 c.c.)	700	Lactose, 1⅔ oz. (50 grams)	200
Cream, 1⅔ oz. (50 c.c.)	100	*Divide into 8 equal portions.*	

[3] Warren Coleman, M.D., in *Nelson Loose-Leaf Living Medicine*, New York: Thomas Nelson and Sons, 1920-44.

[4] Cooked without sugar.

[5] Approximately the same as the top 2 oz. from a quart bottle of milk which has stood at least 6 hours. This is not heavy cream. To add lactose to milk, boil 15 grams (½ oz.) of lactose in 30 c.c. (1 oz.) of water; cool and add to milk.

[6] *Ibid.*

[7] Some of these combinations appeared in the *American Journal of Medical Science*, Vol. 143, p. 77; the others were arranged by Miss Estelle Magill, formerly Head Nurse of the Russell Sage Institute of Pathology.

OR

	CALORIES
Eggs,[8] 2	150
Lactose,[9] 30 grams (1 oz.)	120
Sugar,[10] 25 grams (4/5 oz.)	100
Milk, 800 c.c. (26 2/3 oz.)	560
Cream, 30 c.c. (1 oz.)	60
Lemon juice, 30 c.c. (1 oz.)	12

	CALORIES
Coffee, 150 c.c. (5 oz.)	00
Tea, 150 c.c. (5 oz.)	00

Divide into appropriate combinations—7 servings.

FOR 1500 CALORIES A DAY

	CALORIES
Milk, 1 1/2 quarts (1500 c.c.)	1000
Cream, 1 2/3 oz. (50 c.c.)	100
Lactose, 3 1/3 oz. (100 grams)	100

Divide into 6 equal portions.

OR

	CALORIES
Eggs, 2	150
Lactose,[11] 110 grams (3 2/3 oz.)	440
Sugar, 25 grams (4/5 oz.)	100
Milk, 800 c.c. (26 2/3 oz.)	560
Cream, 120 c.c. (4 oz.)	240

	CALORIES
Lemon juice, 30 c.c. (1 oz.)	12
Coffee, 150 c.c. (5 oz.)	00
Tea, 150 c.c. (5 oz.)	00

Divide into appropriate combinations—7 servings.

FOR 2000 CALORIES A DAY

	CALORIES
Milk, 1 1/2 quarts (1500 c.c.)	1000
Cream, 8 oz. (240 c.c.)	500
Lactose, 4 oz. (120 grams)	500

Divide into 7 equal portions.

OR

	CALORIES
Eggs, 2	150
Lactose, 125 grams (4 oz.)	500
Sugar, 15 grams (1/2 oz.)	60
Milk, 1000 c.c. (32 oz.)	700
Cream, 240 c.c. (8 oz.)	480
Cocoa, 5 grams	25

	CALORIES
Orange juice, 60 c.c. (2 oz.)	30
Lemon juice, negligible	00
Coffee, 150 c.c. (5 oz.)	00

Divide into appropriate combinations—7 servings.

[8] Beat the eggs lightly in a cup, dissolve lactose thoroughly in very hot coffee, pour over beaten eggs, stirring constantly, strain, add sugar, and serve. This may be served hot or iced.

[9] Lactose to be thoroughly dissolved in very hot tea before adding cream.

[10] Dissolve sugar in water, add lemon juice, and pour over beaten egg, add cracked ice, strain, and serve. Or dissolve sugar in water and put with other ingredients into a shaker, shake thoroughly, strain, and serve.

[11] Boil lactose and sugar in water for 2 minutes and cool before adding lemon juice

FOR 2500 CALORIES A DAY

	CALORIES		CALORIES
Milk, 1½ quarts (1500 c.c.)	1000	Lactose, 8 oz. (240 grams)	1000
Cream, 8 oz. (240 c.c.)	500	*Divide into 7 equal portions.*	

OR

	CALORIES		CALORIES
Milk, 1 quart (1000 c.c.)	700	Butter, 10 grams (⅓ oz.)	80
Cream, 240 c.c. (8 oz.)	480	Orange juice, 120 c.c. (4 oz.)	60
Eggs, 3	225		60
Lactose, 165 grams (5½ oz.)	660	Lemon juice, (1½ oz.)	20
Sugar, 40 grams	160	*Divide into appropriate combinations—8 servings.*	
Bread, 1 slice, 30 grams	80		
Uneeda biscuit, 1	25		

FOR 3000 CALORIES A DAY

	CALORIES		CALORIES
Milk, 1½ quarts (1500 c.c.)	1000	Lactose, 8 oz.	1000
Cream, 1 pint (480 c.c.)	1000	*Divide into 8 equal portions.*	

OR

Breakfast:	CALORIES	Dinner: [12]	CALORIES
Farina	100	Eggs, 2	150
Toast, 1 slice (30 grams before toasting)	80	Potato, 1 medium, about	100
Cream 100 c.c. (3⅓ oz.)	200	Bread, 1 slice, or roll, 1, about	80
Butter, 8 grams	60	Butter, 30 grams (1 oz.)	230
Lactose, 40 grams (1⅓ oz.)	160	Apple, 1 medium (pared and cored)	75
Sugar, 20 grams	80	Sugar, 15 grams (½ oz.)	60
Coffee, 1 large cup or 2 small cups (300 c.c.)	00	3 to 4 P.M.:	
		Tea 150-1200 c.c.	00
		Lactose, 50 grams	200
		Sugar, 5 grams	20
10 to 10:30 A.M.:		Cream, 50 c.c. (1⅔ oz.)	100
Milk, 200 c.c. (6⅔ oz.)	140	Crackers, 3 Uneeda, or 2 soda, toasted	75
Cream, 50 c.c. (1⅔ oz.)	100	Butter, 8 grams	62

[12] Potato baked, served with butter. Apple baked with 15 grams sugar and about 8 grams butter. Some patients will eat more butter if unsalted butter is used in the diet.

Supper:	CALORIES
Rice, 25 grams, or farina, cooked with	100
Milk, 100 c.c. (3⅓ oz.)	70
Toast, 30 grams (1 slice)	80
Butter, 8 grams	62
Sugar, 5 grams (for cereal)	20
Cream, 60 c.c. (2 oz.)	120
Orange, 1 (sliced)	100
Sugar, 5 grams (with orange)	20
8 to 9 P.M.:	
Cocoa, 5 grams	25
Sugar, 10 grams	40
Milk, 150 c.c. (5 oz.)	105
Cream, 30 c.c. (1 oz.)	60
Lactose, 25 grams	100

FOR 3900 CALORIES A DAY

	CALORIES
Milk, 1½ quarts (1500 c.c.)	1000
Cream, 1 pint	1000
Lactose, 16 oz. (480 grams)	1900

Divide into 8 equal portions.

FOR 3910 CALORIES A DAY[13]

Approximate values—protein, 90 grams; fat, 250 grams; carbohydrate, 318 grams

Schedule of Feeding: 9 A.M., 1, 3, 7, 10 P.M., and 1 and 4 A.M.

At 9 A.M.:	CALORIES
Milk, 6 oz.; total, 1260 c.c.	860
Cream, 2 oz.; total, 420 c.c.	840
Lactose, 10 grams; total, 70 grams	280
Total Calories 1980	
At 11 A.M.:	
Egg, 1	80
Mashed potato (20 grams)	20
Custard (4 oz.)	250
Toast or bread (1 slice)	80
Butter (20 grams)	150
Coffee	00
Cream (2 oz.)	120
Lactose (20 grams)	80
Total Calories 780	
At 5 P.M.:	
Egg, 1	80
Cereal, 3 tbsp.	150
Cream, 2 oz.	120
Apple sauce, 1 oz.	30
Tea	00
Cream, 3 oz.	180
Lactose, 20 grams	80
Total Calories 640	
At 7 A.M.:	
Egg, 1	80
Toast, 1 slice	80
Butter, 20 grams	150
Coffee	00
Cream, 2 oz.	120
Lactose, 20 grams	80
Total Calories 510	

Milk-sugar lemonade may be substituted for the milk mixture at 3 o'clock.

[13] Warren Coleman, M.D., in *American Journal of Medical Science,* Vol. 143 p. 77.

FOR 5580 CALORIES A DAY

Approximate values—protein, 122 grams; fat, 293 grams; carbohydrate, 515 grams

	CALORIES
Milk, 5 oz., at 9 and 11 A.M., 1 P.M.; 1200 c.c.	820
Cream, 2 oz., at 3, 7, and 10 P.M.; 480 c.c.	1440
Lactose, 15 grams, at 1 and 4 A.M.; 120 c.c.	480
Total Calories 2740	

At 11 A.M.:

Eggs, 2	160
Toast, 2 slices	160
Butter, 20 grams	150
Mashed potato, 70 grams	70
Custard, 8 oz.	500
Total Calories 1040	

At 5 P.M.:

	CALORIES
Egg, 1	80
Toast, 2 slices	160
Butter, 20 grams	150
Cereal, 6 tbsp.	290
Cream, 4 oz.	240
Apple sauce, 1 oz.	30
Cream, 2 oz.	120
Lactose, 20 grams	80
Total Calories 1150	

At 7 A.M.:

Egg, 1	80
Toast, 2 slices	160
Butter, 20 grams	150
Coffee	00
Cream, 3 oz.	180
Lactose, 20 grams	80
Total Calories 650	

Use chicken only after convalescence is established

SCARLET FEVER

Food requirement As in other febrile conditions, a rather high-calorie diet should be given; but, because of danger of serious kidney complications, the protein should be kept low. Eggs are excluded at first, and no meat should be given until danger of complications is past.

Foods allowed The diets recommended for typhoid, including milk but without eggs, are quite suitable.

Should indication of nephritis appear, diets recommended for that condition should be adopted.

WHOOPING COUGH

Food requirement The danger in whooping cough is from undernourishment. Paroxysms of coughing often give rise to vomiting, and these frequently follow eating so closely that food has no chance to be-

come assimilated. In such cases it is better to give food in smalle quantities and oftener, possibly every two hours, rather than to depen on the regular three meals a day.

Foods allowed The diet should consist of foods that can be quickl digested and assimilated. Anything at all irritating or liable to excit coughing, such as dry toast or the bran of coarse breads and cereal should be avoided. The liquid and soft high-calorie diets recommende for typhoid fever are suitable to use.

MEASLES

Food requirement In measles the food requirement is about th same as with any infectious disease accompanied by fever. There i nothing to be especially avoided, and the caloric value should b kept up.

Foods allowed Fluid and semifluid diets should be used.

Cautions Because of the characteristic eruptions not only on th surface of the body, but on the mucous lining of the intestines, car should be taken to avoid food that would be in any way irritating After the eruption disappears, the diet may be returned rapidly t normal.

INFLUENZA (GRIPPE)

Fever is the determining factor in this disease, and the patient may have any simple foods chosen from those allowed in fever diets tha his appetite calls for. Since grippe manifests itself in various ways, i is sometimes necessary to modify the diet accordingly. If the bronchial tree is affected, the feedings should be regulated as in bronchitis; i gastro-intestinal complications are present, the diet should be simila to that prescribed in gastritis. In convalescence the patient may take a more liberal diet of soft solids, increasing rapidly to full diet.

THROAT AFFECTIONS

Food requirement Diets in such affections as tonsillitis, quinsy, and diphtheria with accompanying fever, do not differ essentially from those used in other febrile conditions. The energy requirement shoul be fully met, as a well-nourished body can more easily combat anemi or the bronchial and pulmonary complications which sometimes follo these diseases.

Foods allowed The inflamed condition of the throat makes swallowing painful; hence food that is least irritating should be given, such as liquids and semisolids. In fact, semisolids are sometimes less painful to swallow than liquids. Lukewarm food is occasionally more comfortable to a raw or inflamed membrane than food which is either very hot or very cold. The use of a high-calorie diet allows the total amount of food to be reduced and the pain of swallowing correspondingly lessened. Diets recommended for typhoid fever may be used to advantage with these diseases.

GAUSS'S FEVER DIET [14]

"**Principles** First Stage (onset), comparative intestinal rest. Second Stage (period of high fever), easily digested foods and approximately basic diet. Third Stage (convalescence), restoration of balanced diet.

"**Indications** Acute infectious fevers.

"**Note** There is no such thing as a standard fever diet. The course and nature of the fever is the indication for the diet. Obviously in typhoid fever the second stage of the diet is continued considerably longer than in pneumonia. The diets must be varied from day to day to relieve the monotony. In fevers of more than a week's duration, the second-stage diet may be increased to guard against undue loss of weight. These diets are intended as guides only."

FIRST STAGE

	PROTEIN	FAT	CARB.	CALORIES
8 A.M.:				
Orange juice, 50 grams	0.4	0.1	5.8	26
10 A.M.:				
Meat broth, clear	0.0	0.0	0.0	00
Noon:				
Oatmeal gruel, 100 c.c.	1.2	0.4	6.3	34
Milk, 60 c.c.	2.0	2.4	3.0	43
3 P.M.:				
Ice cream, 100 grams	5.2	10.2	17.7	189
6 P.M.:				
Eggnog, 1 glass	13.0	12.8	29.5	294
9 P.M.:				
Meat broth, clear	0.0	0.0	0.0	00
	21.8	25.9	62.3	586

[14] Harry Gauss, M.D., "Special Diets in Disease," in *Modern Hospital,* 28 (1927), 132.

SECOND STAGE

8 A.M.:	PROTEIN	FAT	CARB.	CALORIES
Orange juice, 50 grams	0.4	0.1	5.8	26
Oatmeal gruel, 100 c.c.	1.2	0.4	6.3	34
Cream, 20 per cent, 30 c.c.	1.1	7.7	1.0	81
10 A.M.:				
Eggnog, 1 glass	13.0	12.8	29.5	294
Noon:				
Meat broth	0.0	0.0	0.0	00
Boiled rice, 100 grams, sugar, 2 grams, milk, 60 c.c.	4.8	2.5	29.4	163
Cornstarch pudding or tapioca custard	1.0	1.2	79.00	340
3 P. M.:				
Chocolate custard, 120 grams or Jell-O	8.1	10.0	17.7	200
6 P.M.:				
Cream tomato soup, 125 c.c.	3.0	9.4	6.4	126
Soft-boiled egg, 1	6.6	6.0	0.0	83
Ice cream, 100 grams	5.2	10.2	17.7	189
9 P.M.:				
Eggnog, 1 glass or rennet custard	13.0	12.8	29.5	294
	57.4	73.1	222.3	1830

THIRD STAGE

8 A.M.:	PROTEIN	FAT	CARB.	CALORIES
Orange juice, 50 grams	0.4	0.1	5.8	26
Farina, 100 grams	1.6	0.2	11.5	56
Cream, 20 per cent, 30 c.c.	1.1	7.7	1.0	81
Eggs, soft-boiled, 2	13.2	12.0	0.0	166
White bread, 2 slices, 53 grams	5.5	0.8	31.8	160
Butter, 15 grams	0.1	12.7	0.0	118
10 A.M.:				
Cocoa, 220 c.c.	9.0	15.5	23.8	279
Noon:				
Cream celery soup, 125 c.c.	3.0	8.9	5.0	116
Potatoes, creamed, 100 grams	2.6	3.0	17.8	112
Scraped meat, 50 grams	10.5	5.3	0.0	93
Puréed carrots, 100 grams	0.5	0.2	3.4	18
White bread, 1 slice, 27 grams	2.7	0.4	15.9	80

THIRD STAGE—Continued

	PROTEIN	FAT	CARB.	CALORIES
Noon:				
Butter, 7½ grams	0.0	6.3	0.0	59
Soft custard, 60 grams	4.4	6.2	12.1	131
3 P. M.:				
Egg lemonade, 220 c.c.	6.7	5.2	42.3	250
6 P.M.:				
Milk toast				
Milk, 220 c.c.	7.3	8.8	11.0	157
White bread, toasted, 2 slices, 53 grams	5.5	0.8	31.8	160
Butter, 7½ grams	0.0	6.3	0.0	59
Puréed spinach, 100 grams	2.1	4.1	2.6	57
Ice cream, 100 grams	5.2	10.2	17.7	189
9 P.M.:				
Cornstarch or tapioca pudding	1.0	1.2	79.0	340
	82.4	116.5	312.5	2707

QUESTIONS FOR STUDY

1. What causes loss of body weight in fever?
2. How can this loss be prevented?
3. How does the energy requirement of a fever patient differ from that of the same individual in health?
4. How does the protein requirement in fever differ from that in health?
5. Calculate the energy requirement of a fever patient weighing 60 kilograms.
6. How much protein should his diet contain?
7. What type of diet should be used in fever?
8. What difficulties may arise with this type of diet?
9. How may these be overcome?
10. What does the term "tympanites" mean?
11. Give a list of foods which may be used in typhoid fever.
12. What is the correct method of adding lactose to cold beverages? Hot beverages?
13. Plan a day's dietary suitable for a fever patient and furnishing about 3000 calories. State the hours at which feedings should be given.
14. Name the diseases studied so far in which a high-calorie diet should be used.
15. What restrictions of diet should be made in scarlet fever? Why?
16. What special precautions are necessary in feeding in whooping cough? Measles? Why?

7.

DISEASES OF THE LUNGS [1]

TUBERCULOSIS

Cause and incidence Tuberculosis is an infectious disease caused by a microorganism known as the tubercle bacillus. In the United States and a number of other countries, eradication of tuberculous cattle and pasteurization of milk practically have eliminated cattle as a source of tubercle bacilli, and new infections are caused always or almost always by tubercle bacilli from the lungs of tuberculous persons.

Although the death rate from tuberculosis in many countries is much less than formerly, the disease continues to be a major public-health problem and a leading cause of death in young adults. Statistics indicate that the incidence of tuberculosis is highest in low-income groups.

Nature and types With very few exceptions, the lungs are the portal of entry into the body for tubercle bacilli; and more than 90 per cent of deaths from tuberculosis exhibit advanced disease in the lungs. By the time they have reached adult life, the majority of persons have acquired primary-type tuberculosis, a tuberculous infection that, except in infancy, tends to heal without causing ill-health.

The common type of clinical tuberculosis, the reinfection type, which affects adolescents and adults, is due to the inhalation of additional bacilli or to the progression or reactivation of imperfectly controlled primary disease.

Principles of prevention and treatment Among measures that are considered important for prevention of disease in persons who are known to have contact with tuberculous patients, an adequate, properly balanced diet is important. In some instances, relief agencies have given additional funds to provide extra food for tuberculosis contacts. Similarly, special attention to dietetic requirements is indicated for indi-

[1] This chapter, originally prepared by Dr. J. Burns Amberson, Jr., was revised in 1944 by Dr. H. W. Hetherington, M.R.C.P., Clinic Chief of the Henry Phipps Institute, University of Pennsylvania; author (with Fannie Eshlemen), of *Nursing in Prevention and Control of Tuberculosis.*

viduals with asymptomatic tuberculous lesions and with apparently arrested or apparently healed tuberculosis. In infants and young children with tuberculosis, the diet must be suitable to the age and varies little from the usual diet recommended for healthy children of the same ages.

For patients with clinical tuberculosis, rest treatment either at home or an institution, and in many instances special forms of treatment—as, for example, artificial pneumothorax thoracoplasty and operations on the phrenic nerve—are recommended by the physician.

While there is no evidence that any element in the diet specifically prevents or cures tuberculosis, it is generally accepted that a proper diet is an indispensable part of treatment.

In general, the patient with uncomplicated tuberculosis thrives on three simple, properly diversified, well-prepared meals a day, which should include a liberal allowance of milk. In advanced complicated cases, special adjustments are often necessary.

On the average, a patient weighing 150 pounds needs a maximum of 2500 to 3000 calories for his energy requirements. Some do better with less, at least at the start. The provision of all necessary elements in adequate amount should be arranged. Theoretically, there may be reasons for restricting protein intake; but there are other more important reasons for giving it in reasonable amounts, especially in febrile cases, where the loss of tissue proteins may be excessive.

Amberson agrees, therefore, with the recommendation of Pottenger that an average daily diet may be divided into about 100 grams of protein, 80 to 100 grams of fat, and 400 to 500 grams of carbohydrate, some thought being given to the inclusion of articles containing the various essential minerals and vitamins. Milk, cream, butter, cheese, eggs, fresh vegetables, cereals, and fresh fruit belong to the fundamentals; but, as Alvarez has shown, raw eggs are much less digestible than boiled, poached, or coddled eggs, contrary to general belief.

The once-popular practice of overfeeding tuberculous patients accomplished little or nothing and has been generally abandoned. Patients, especially, sometimes deceive themselves into believing that the amount and rapidity of weight increase is an index of the healing of the disease. The fact is that tuberculosis may advance while the patient is putting on tens of pounds. Excessive overnutrition, in the tuberculous as in the well, is a positive handicap.

Patients are not harmed and may feel some benefit in taking light

wine or beer with meals. It seems best to include this only on occasion and not habitually.

Psychotherapy and diet In most instances, tuberculosis runs a chronic course requiring months or years of treatment. Enforced idleness, disappointed hopes, and repressed ambitions do not conduce to good digestion; and pent-up rebelliousness often finds expression in complaints against the cuisine. Although these complaints are frequently unreasonable, they should be met with sympathy and understanding. Whenever possible, attention should be given to patients' individual and racial eating habits if they can be made to conform to the nutritional requirements. Particularly in institutions, meals should be varied and should be served tastefully and attractively. They are often the only big events of the day for many days on end. They should be enjoyed to accomplish the most good.

SYMPTOMS AND DIET

Certain symptoms deserve attention in relation to diet.

Anorexia Lack or loss of appetite may be caused by the toxemia and disappear with rest in bed.

Fever Patients with a significant degree of fever may require a soft or semisoft diet. Weakened patients may do better with four or five small feedings a day. If there has been a digestive upset, a simple milk-and-cracker diet for a day or so may allow the function to restore itself.

Constipation The best corrective for constipation is the cultivation of regular habits, which the patient "on the cure" can very well do. Adjustment of the diet to include additional fruits, salads, and leafy vegetables usually is sufficient to promote proper peristalsis. Patients troubled with constipation and flatulence sometimes are relieved by avoiding sweet milk, or by substituting buttermilk or acidophilus milk. The addition of lime water (one dram to a pint) is sometimes useful when ordinary milk causes indigestion. Constipation may be largely of psychogenic origin and disappear when the patient settles down to a placid, unworried routine of rest. In some instances, mineral oil or small doses of milk of magnesia may be indicated.

Emetic cough Occasionally the patient may lose most of his meals in this way. A drink of hot water or other stimulating expectorant before the meal, especially in the morning, may give relief by promoting the expectoration of accumulated secretions. Here again frequent small

feedings may be preferred for a long time. When meals are lost due to vomiting induced by cough, additional food should be taken as soon as the cough and vomiting have subsided.

Undernutrition Rest and simple diet usually suffice. Intermediate feedings of milk, varied with fruit juice, beef broth, or light custards, may help. The most important point is to keep urging the patient, gently but firmly, to eat but not to stuff. Chronic undernutrition may be due to some complication.

Insomnia Some do better by lightening the evening meal. Others depend on a glass of hot milk at bedtime—not a bad habit.

Hemoptysis Bleeding from the lung is fairly common in tuberculosis and occurs also in such conditions as bronchiectasis, lung abscess, and cancer of the lung. Almost always the patient swallows some of the blood, and this may nauseate him and cause vomiting. During the active bleeding the patient may like to sip a little cold water; but the old practice of feeding quantities of cracked ice does no good, upsets the stomach, and should not be followed. Fluids may be moderately restricted in the first few hours after bleeding. Formerly, the diet for several days consisted only of cold fluids, since the cold was thought to help prevent further bleeding. This appears not to be so. A patient suffering from the shock of hemorrhage needs warmth. The most satisfactory diet, as soon as the patient feels able to take it, is one that is warm, soft, and bland. A light diet may be permitted 3 or 4 days after the hemorrhage has subsided.

DIET IN CASES WITH COMPLICATIONS

Many tuberculous patients, usually those with advanced disease, develop complications in parts outside the lungs, the most frequent being tuberculosis of the larynx and of the intestines. These, as well as other tuberculous and nontuberculous complications, merit special attention to the diet.

Tuberculosis of the larynx Early small lesions in the larynx cause little discomfort and need no particular dietary attention on this account. In the more advanced stages, *dysphagia,* or difficulty in swallowing, may be a prominent symptom and interfere seriously with nourishment. Some patients find the swallowing of liquids much more painful than soft solid food. Heavily salted, spiced, or acid articles cause distress. Spraying the larynx with an anesthetic solution 15 minutes

before meals is often helpful. Some are able to take liquids by lying prone, hanging the head forward and downward over the edge of the bed, and drawing the liquid through a tube from a glass placed on a low table or chair ("uphill drinking"). Occasionally it may be necessary to feed through a naso-esophageal tube, and some have even resorted to the gastrostomy tube. In any event, frequent small concentrated feedings should be given.

Tuberculosis of the intestines The most prominent symptoms are colicky pains in the lower abdomen, diarrhea sometimes alternating with constipation, nervous irritability, and loss of weight or failure to gain. The abdominal symptoms are due to spasm and hypermotility of the intestine. Diet is extremely important. Symptoms may easily be aggravated by a coarse, bulky, irritating diet, raw fruit and vegetables being special offenders. Patients with diarrhea likewise do not tolerate much fat in the diet.

During the seizures of pain and diarrhea, it is usually best to eliminate all regular meals for one or a few days and to give 4 to 6 ounces of boiled skimmed milk with saltines or a piece of dry toast every 2 to 4 hours. This, together with proper medication, usually allays the intestinal spasm and relieves the symptoms. Gradually then the patient may be given articles from the strict and liberal bland diets listed below. These are smooth, low-residue diets which do not irritate the inflamed intestine too much. This should be done in easy stages, remembering that the patient usually has tuberculous ulcers of the intestine and that the condition may take weeks or months to control. However, if the cramps of diarrhea return, time should not be lost in dropping back to the boiled skimmed milk feeding. Twenty-four or 48 hours of this may save much suffering.

Even after the condition is well controlled, these patients must continue, sometimes for many years, to use discretion in diet. Coarse, bulky raw fruits and vegetables are best omitted. In healed cases the resulting scars may contract and give rise to symptoms of partial obstruction. These effects, especially if peritoneal adhesions also form, then manifest themselves in distressing constipation. Only after a thorough medical study has been made can the diet be adjusted intelligently.

STRICT BLAND DIET

Fluids Boiled milk, plain or flavored with coffee, weak tea, cambric tea, malted milk, clear broth, or cream soups strained, beef juice, cocoa.

Cereals Cream of wheat, farina, boiled rice, sago, tapioca, and gruels.

Eggs Soft-boiled or poached—not more than 2 in a day.

Meats Scraped beef, white meat of chicken or squab, fresh white fish, not fried.

Cheese Any mild cheese in small portions.

Vegetables Purée of peas, baby lima beans, or asparagus, small portion of potatoes baked or well mashed with milk.

Bread and crackers Milk toast, toast, plain cracker, zwieback, plain cookies (not too rich).

Desserts Ice cream, plain gelatin jelly with any flavor, custard, rennet-custard, blanc mange, sponge cake, calves' foot or tomato jelly.

No fruits or vegetables unless puréed.

LIBERAL BLAND DIET

Anything under Strict Bland Diet; also

Milk Any form including curds. Also cream.

Beverages Cocoa, coffee, or tea in moderation.

Soups Those containing macaroni, spaghetti, noodles, or soft vegetables without the fiber. Oyster stew, clam broth.

Fruit Orange juice, strained applesauce, well-cooked apple pulp with skin removed, fruit pulps, as prunes, apricots, etc.

Cereals Hominy grits, creamed, corn-meal mush, strained cereals. White bread, toast, buttered sparingly.

Eggs As in a Strict Bland Diet—not more than 4 in a day—any form except fried, but plain.

Meat and fish Lamb chops, well-done tenderloin steak.
Minced or roast lamb, chicken or beef.
Any fresh white fish, broiled, boiled, baked, or creamed.
Any lean meat, broiled.

Vegetables Potatoes mashed, baked, creamed, or puffed; creamed macaroni or spaghetti with grated cheese as flavor; squash, tender young lettuce, lima beans, little celery and asparagus tips, new

green peas or tender little canned peas; purées of vegetables, *except* turnips, cabbage, parsnips, onions, etc.

Desserts Plain puddings, whips or soufflés, Spanish or Bavarian cream, plain cakes, calves' foot jelly, fruit or tomato jelly.

No pastry, no highly spiced food, no rich gravies or sauces.

Tuberculosis of the pleura The pleura is almost always involved in pulmonary tuberculosis. As a rule, this is a "dry" pleurisy, but occasionally a serious effusion may also be present. Some clinicians have found that a diet rich in calcium but practically free of common salt seems to accelerate the absorption of the effusion. The same may be said of effusions in the peritoneal cavity (exudative tuberculous peritonitis).

Tuberculosis and diabetes In the early days, when the treatment of diabetes was crude and unscientific, from 30 to 50 per cent of diabetic patients died with pulmonary tuberculosis. Modern dietary methods and the use of insulin have completely changed the picture for the better. The important thing is to bring the diabetes under control promptly. Since it is desirable, on account of the tuberculosis, to preserve good general nutrition, these patients are given a fairly liberal carbohydrate allowance, sufficient insulin then being administered to insure proper utilization.

Tuberculosis and pregnancy The pregnant tuberculous woman must be kept under close observation, not only during gestation, but also for a considerable time afterward. It is doubly important in these cases to provide large amounts of calcium in the diet and the vitamins which promote the utilization of calcium. Since the situation varies in each case, the individual requirements must be studied and the diet adjusted accordingly.

Acute and chronic abscess of the lung; bronchiectasis; carcinoma of the lung These conditions require no particular dietary attention except that which promotes the general nutrition and insures easy digestion. When the sputum is profuse and foul, the patient may become nauseated and may vomit frequently. Frequent small concentrated feedings are then desirable. Pulmonary hemorrhage may occur in any of these conditions. (See Hemoptysis under Pulmonary Tuberculosis.)

Bronchial asthma Dietary indiscretions frequently aggravate asthma. The food should be easily digestible, smooth, and with a low residue. The evening meals particularly should be light. Fruit juices are valuable, especially for their laxative properties.

In some of these cases there is a disturbance of calcium metabolism, in which event the indicated dietary adjustment may be of great help. Likewise, the possible role of food proteins as a cause of asthma must always be remembered. It may be necessary to try a series of elimination diets until the offending protein is identified. Such diets must be specially ordered.

Chronic pulmonary emphysema This condition may result from a number of causes, including asthma, chronic nontuberculous infection, heart disease, pneumoconiosis, etc. The chief symptoms are chronic dyspnea in varying degrees, undernutrition, and weakness. The importance of diet is in providing menus of easily digestible articles which at the same time will keep up the general nutrition. Usually this is best accomplished by including a liberal allowance of carbohydrates.

PNEUMONIA

Diet in pneumonia Because this is a brief illness, the outcome of which is usually determined within a few days, the actual amount of nourishment which the patient receives is of comparatively little importance. He needs liquids, and for this reason should be given sufficient quantities of water and liquid foods, unless weakness of the heart contraindicates this. Solid food is unnecesary. Small quantities of food at frequent intervals given with the least possible disturbance to the patient should be the rule. While a certain amount of firmness is advisable, the patient's preferences should be given consideration, and foods which he finds distasteful should not be insisted on.

Approximately 2000 calories daily is ample for the adult who has pneumonia; in some cases it is best not to give even this amount. This should include about from 50 to 60 grams of protein.

Milk is eminently suitable; about 1 quart daily should be given. It is best taken straight, or it may be peptonized or diluted with lime water. For variety's sake some of the milk may be flavored with coffee or cocoa, or buttermilk or clabber may be given. Ice cream, malted milk, and cup custards are also suitable.

Two or perhaps 3 eggs may be given daily. Broths, thin vegetable purées, liquid cooked cereals, such as strained oatmeal or farina, and fruit juices are all valuable.

The food should be given at regular intervals, usually every 2 or 3 hours. Nevertheless, rest is a vital necessity for the patient and he should

not be wakened for feeding. A vigilant nurse will usually find ample opportunity for feeding without unduly disturbing the patient.

For the patient who is accustomed to drink coffee, the use of 1 or 2 cups daily is advisable; and, if he is unable to take food by mouth, it is advisable at times to give black coffee per rectum. It may be necessary to give glucose solution intravenously to supply fluid and nourishment to the tissues.

As convelascence begins, semisolid and solid food may be permitted. It is best to proceed with reasonable deliberation in increasing the food of the convalescent; he should not be permitted suddenly to take a large, unlimited amount of food. The distressing abdominal distention which sometimes accompanies pneumonia has little or nothing to do with the diet. It probably represents a toxic paralysis of the bowel and cannot be combated by mere dietary regulation.

ACUTE BRONCHITIS

This may be the result of an initial respiratory infection, or it may appear as a complication of certain exanthemata or certain chronic diseases.

Foods allowed During the acute febrile stage, the diet should be liquid or semisolid, somewhat similar to that in pneumonia except that frequently more food can be taken. As soon as a patient wishes solid food, it may be given, using only easily digested food. Should the disease accompany gout or nephritis, as it does with some elderly people, the diet should be such as is recommended for those disorders.

QUESTIONS FOR STUDY

TUBERCULOSIS

1. Discuss the nature and course of tuberculosis.
2. What is the fundamental principle of treatment?
3. Discuss the arrangement of meals.
4. What caloric allowance is required by a man weighing 150 pounds?
5. Should protein be restricted?
6. What should be the proportion of protein, fat, and carbohydrate in an average daily diet?
7. Is overfeeding desirable?
8. Discuss the psychologic attitude of the tuberculous patient.

9. Mention three symptoms which may influence diet.
10. Discuss tuberculosis of the larynx. Of the intestines.
11. Plan menus for one day from the strict bland diet. From the liberal bland diet.
12. What effect on the diet is caused by an accompanying diabetic condition?
13. Discuss bronchial asthma.

PNEUMONIA

1. What is a suitable diet in pneumonia?

BRONCHITIS

1. What foods are allowed in bronchitis?

8.

DISEASES OF THE STOMACH AND DUODENUM [1]

Actually one cannot prescribe a diet for disease of the stomach alone because all food must go on into the intestine; and the intestine is the main organ of digestion, the stomach being a sort of hopper in which the food is held until it can be warmed, liquefied, partly digested, and made less irritant for the small bowel.

There is very little absorption of food in the stomach and practically no absorption of water. Alcohol is about the only substance that can pass readily through the gastric mucosa.

Much of digestion and almost all of absorption takes place in the small intestine. Physicians often try to spare the stomach from strain and insult by giving an irritant medicine in keratin-coated capsules, hoping in this way to get it through into the bowel before it can produce vomiting. All research work, however, shows that the stomach stands insult and injury much better than does the intestine. In fact nature seems to have designed the stomach to dilute and neutralize irritant materials and to hold them for a time while small amounts are fed gradually into the bowel.

It is for this reason that in the past, before so much was known about nutrition, dietetic efforts made to spare the stomach frequently proved disastrous. For instance, a pediatrician once tried to help sick children by giving them meat finely ground and predigested with hydrochloric acid. What happened was that this material poured out through the pylorus so fast as to overwhelm the small intestine. If it had come out normally in little spurts, the bowel could have attended to it; but when the whole amount was dumped in within a few minutes the bowel

[1] This chapter was prepared by Dr. Walter C. Alvarez, professor of medicine, University of Minnesota (Mayo Foundation); consultant to the Division of Medicine, Mayo Clinic, Rochester, Minn.; past president of the American Gastro-Enterological Association; author of *An Introduction to Gastro-Enterology* and *Nervousness, Indigestion and Pain;* also of the chapters on "Diseases of the Stomach" and "Diseases of the Intestine" in *Oxford Medicine.* Revised by Dr. Alvarez, 1944.

was overwhelmed, there was much indigestion and diarrhea, and the children were worse.

In infants, milk is promptly clotted by a ferment so that it cannot escape from the stomach too soon. In the adult, it often runs rapidly into the small bowel where, undigested and iced, it causes distress and gas. It is probably for this reason that some persons who cannot handle ordinary milk with comfort can digest with ease rennet-custard, fermented milk, or cottage cheese. It is probably for this reason also that some persons who feel distress within a few minutes after drinking water or eating a semifluid meal are relieved when put on a "dry diet" in which there is little liquid. All the water they take must be sipped slowly between meals.

All this goes to show that there are limits beyond which we cannot go in our efforts to spare the stomach. We must keep in mind the fact that, except when the wall of the stomach is definitely diseased, we should always feel more concern for the more delicate mucous membrane of the small bowel.

He who would treat disease of the digestive tract must remember also that the symptoms of indigestion are principally due to disturbances in the mechanical functions of the stomach and bowel. So long as the waves of peristalsis are running downward away from the mouth, all is likely to be well, and the patient is comfortable and unconscious of what is going on in the abdomen; but just let the waves slow up or stop or, worst of all, reverse their activity, and the patient feels full, gassy, or nauseated.

Frequently patients complain of distress immediately or within a few minutes after eating anything, or even after drinking a little water. It is obvious then that no particular article of food is at fault, and that the condition cannot be benefited by diet. The taking of anything whatever into the stomach is going to start abnormal waves of peristalsis which will run back toward the gullet and cause a strangling feeling, a desire to belch, regurgitation of food, together with "acid stomach" or heartburn.

DISEASES OF THE STOMACH

Diseases of the stomach are surprisingly few, especially when one excludes those very rare ones which are seldom encountered. Alvarez states that out of 500 consecutive patients whom he saw in private

practice in 1925, all of whom complained of indigestion, he could find definite disease of the stomach in only 10.

In only 1 out of 3 did the disease seem to be in the digestive tract. The most common single cause of such "true" indigestion he found to be gallbladder disease, and the next most frequent cause was duodenal ulcer.

In one-fifth of the 500 cases the indigestion was so severe as to suggest the presence of organic disease in the abdomen, but none could be diagnosed with certainty. In 1 out of 20 the trouble seemed definitely to be due to high blood pressure. In 1 out of 10 there was organic disease in other parts of the body; and in 1 out of 5 the indigestion seemed to be functional and due to constitutional weakness and nervousness or psychopathy, or to fatigue, strain, or unhappiness.

It should be clear from this that in most cases of indigestion the dietitian cannot hope to treat intelligently and scientifically a specific disease of any one part of the digestive tract. All she can hope to do is to arrange a diet which will lessen the work of the digestive organs and humor their idiosyncrasies, and at the same time supply enough food to maintain life. If the symptoms disappear and the patient recovers, well and good; if the distress continues unabated even with a markedly restricted diet, it is likely that causes are at work which one cannot hope to nullify in any way by diet.

THE SMOOTH DIET

After several years of observation and original investigation, Alvarez became convinced that the material in foods which is most difficult to digest is cellulose. This is especially true if the food is not well masticated. When he removed lettuce, tomato, celery, raw apples, oranges, and other cellulose-rich foods from the diet, many of the patients were relieved of their symptoms of indigestion.

He believes further that the discomfort which some persons experience after eating fruits and many vegetables is due to their high cellulose content rather than to the contained acids, which are weak and present only in small amounts.

Since the time of Hippocrates in 400 B.C. the value of a smooth diet has been recognized, and this type of diet has been freely used in medical practice. Animal experimentation has shown that a weakened, flabby, or partially obstructed intestine can handle fluids or material of the

consistency of a cream soup when it cannot pass solids onward. Hence it is that a smooth diet is particularly helpful and even necessary when the patient is weak, frail, and run down; or when, as in bad cases of pulmonary tuberculosis, there are ulcerated, sensitive, and narrowed places in the intestine; or when the patient has had an operation on the bowel, and suture lines are still irritable.

A smooth diet is absolutely essential in cases of stricture or carcinoma of the bowel, with mild obstruction. It is advisable in every case of indigestion in which the patient, for one reason or another, cannot chew his food. It is very helpful in all cases of indigestion in which the diagnosis is not yet clear, or in which there is no definite indication for a highly specialized diet. It is useful in cases of diarrhea, in which the physician does not want the bowel to be overstimulated; in cases of peptic ulcer, in which the scab must not be scratched off the lesion; and as a basis for a diet used for overfeeding when it is desired to give the largest amount of food with the least burden to a weakened digestive tract.

Following is the smooth diet list as it is given to many of the patients at the Mayo Clinic.

ALVAREZ'S SMOOTH DIET

BREAKFAST:

Fruit Orange juice, grapefruit (avoiding the fiber), well stewed prunes, rhubarb, applesauce, baked apples, pears. (Avoid melons if they cause regurgitation or gas.)

Cereals Any smooth mush, such as farina, cream of wheat, corn meal, or rolled oats. Puffed cereals, cornflakes. (Avoid shredded wheat and other coarse breakfast foods. Bran must not be used in any form.)

Breads White-bread toast, zwieback with butter. Graham bread is permitted but not the coarser whole-wheat breads.

Eggs One or two, with bacon or ham.

Beverages Coffee in moderation if it does not cause flatulence, Sanka, Kaffee Hag, Postum, tea, chocolate, cocoa. (The last two only if they agree and do not produce headache.)

LUNCHEON AND DINNER:

Fruit Fruit cocktail, avoiding pieces of orange, apples, and pineapple.

Soup Cream soup, chowder. Also beef broth, bouillon, and vegetable soups, except in cases of ulcer.

LUNCHEON AND DINNER (continued):

Meat and eggs Meat (except pork), chicken, fish (except smoked), crab and lobster only if well borne, oysters, eggs.

Vegetables Potatoes (baked, mashed, hashed brown, French fried), sweet potatoes, rice, hominy, tomatoes (stewed, strained, and thickened with cracker or breadcrumbs), asparagus tips, beets, turnips, French carrots, creamed spinach, Italian pastes (noodles, macaroni, soft cooked spaghetti), purées of peas, beans, lentils, lima beans, or artichoke hearts, well-cooked celery, tender and digestible string beans, canned. Sweet corn is allowed only if passed through a colander.

Salads Lettuce (well chewed) with tomato jelly, hard-boiled egg, raw tomato with the skin and tough center removed, string beans, pears, or peaches. Also potato salad without onion. Mayonnaise and French dressing are permitted.

Bread Bread and butter; hot biscuits if made small so as to consist mainly of crust.

Milk One or two glasses daily if well borne.

DESSERT:

Simple puddings, custards, ice cream, gelatin desserts.

Fruits, canned or stewed, particularly pears and peaches. Also baked apples and pears.

Blackberries and loganberries, stewed and strained, with the sweetened juice thickened with cornstarch. (This makes a delicious dish with the full berry flavor.)

Pears and peaches, fully ripe, may be tried later.

Bananas—most digestible when cooked.

Pies—filling of apple, peach, apricot, custard, or lemon cream pie. Avoid lower crust if tough and soggy.

Plain cake.

Cottage cheese—other cheeses often cause trouble.

In case of constipation, bulk can be added to the diet in several ways. Prunes are laxative, and especially figs. They should be well stewed so that the skin will be soft. Somewhat laxative also are stewed apples and raw pears and peaches. Bananas may be eaten if fully ripe. Among the smoothest bulk producers are chopped agar, gum obtained from psyllium seeds, and karayo. These substances often work best when taken only 2 or 3 times a week; if taken every day, the effect wears off. Often it helps to discontinue their use for a week after the bowel has stopped responding to their presence. Sauerkraut juice helps some

persons. Others are relieved by, each morning, drinking several glasses of water, each with a third of a teaspoon of salt in it.

Instructions as to diet If the patient is to give this diet a fair trial, he must eat no coarse foods with fiber, skin, seeds, or gristle. He must avoid salads with celery, cucumber, orange, pineapple, and apple. Also, he must avoid raisins, berries, jams full of seeds, nuts, and some of the raw fruits and green vegetables.

Cooked cabbage, cauliflower, sprouts; raw apples, onions, peppers, cucumbers, melons, radishes; dried beans, corn on the cob, pickles, spices and nuts are notoriously gassy and indigestible.

Many persons are highly sensitive also to milk, eggs, chocolate, tomatoes, lettuce, spinach, cheese, and greasy foods. It would be well to study the patient's reaction to these foods by getting him to keep a written record of his experience.

A patient on this diet should take no bran, rough breakfast food, paraffin oil, or chemical laxative until it is prescribed by the physician.

Much indigestion is due purely to eating hurriedly or absent-mindedly, or when worried or upset. The patient must have peace and quiet while he eats.

Indigestion can be avoided also by resting for a few minutes before the meal and for a half-hour or more after the meal.

This diet should be tried faithfully for a time. If it works well, other foods may be experimented with, one at a time. If a person has learned by experience that some of the foods allowed on this list are hurtful to you, he should leave them alone.

Anyone living in a boardinghouse can follow this diet by avoiding forbidden foods and eating more of the digestible ones which are put before him.

A patient should not eat candy or other food between meals unless told to do so by the physician.

Fried foods are not bad if they are properly fried—that is, totally immersed in fat at the right temperature. Well-made pies are probably not so indigestible as is commonly believed. Bread is more digestible when toasted.

The chewing of gum sometimes causes distress because air is swallowed with the saliva. At other times gum chewing may give much relief from heartburn, regurgitation, and nausea because it drives the up-coming waves down again.

Make no effort to have the patient drink water unless so ordered

by the physician. Let him be guided by his thirst. At times flatulence, bloating, and indigestion can be cured by the avoidance of liquids such as water, milk, or soup with meals. Excessive use of salt, pepper, or other seasoning should be avoided.

The patient who wishes to gain in weight should eat as much cream, butter, fat, and starchy foods as he can. If he wishes to lose weight or stay thin, he should live largely on the permitted vegetables, fruits and salads, with a moderate amount of lean meat, an egg, and a glass of skimmed milk each day.

Purées of many vegetables have now been placed on the market by a number of canners.

Dangers of too much roughage It will be seen that the foregoing instructions contain a certain amount of general information about food which may help the intelligent patient to adjust the diet to his or her particular needs and idiosyncrasies.

A word of warning is given in regard to overindulgence in fruits, greens, salads, roughage, and substances containing iron and vitamins with the idea that roughage-supplying substances are all highly digestible as well as necessary to life. The present craze for rough food doubtless brings the gastro-enterologist many patients whose indigestion is due purely to the fact that they are trying to digest a vegetable and fruit diet with the carnivorous type of stomach and intestine with which nature has provided them.

Man was without doubt originally a hunter or a fisherman. Only after thousands of years did he learn to scratch the ground with a stick, to grow grain, and to make himself a little coarse bread. Such foods as oranges, grapefruit, pineapple, asparagus, spinach, and tomatoes are comparatively recent additions to the American table. In fact, it was not so many years ago that tomatoes were commonly thought to be poisonous.

Alvarez questions the wisdom of the indiscriminate and thoughtless addition of vitamins to all diets, especially those for adults of average or more than average intelligence and income. In such groups only recluses and food cranks are likely to get into trouble. He emphasizes that, when dealing with children, especially those of the poor, and when dealing with pregnant women, nursing mothers, poor people who are living close to the edge of starvation, and polar explorers, the greatest care must be taken to see that the diet is adequate in every detail. When, however, one is dealing with people of good or average

income who are not fussy about their eating, he feels sure that the dietitian should not worry about vitamins, especially when her patient is to be in the hospital for only two or three weeks. When a physician has a patient in the hospital for the treatment of some particular disease, or for an operation on the stomach or bowel, all he wants is that the dietition supply a diet which will be digested easily and without discomfort by the man who is upset perhaps by an operation and who, in addition, may always have been highly sensitive to one or more foods. The physician does not want the dietitian to protect his patient from beri-beri or scurvy—diseases so rare that they are seldom seen; what he wants is a diet that will agree and not cause gas pains or nausea or vomiting.

FOOD SENSITIVENESS AND FOOD ALLERGY

Adjustment of a diet to a particular patient Most patients with indigestion are more or less sensitive to one or more foods. Not all of them have much actual suffering. Most of them experience only a moderate amount of discomfort from eating the foods to which they are sensitive, but a few are so severely poisoned that they can hardly take a mouthful of the offending substances.

There is a great tendency to say to a patient who protests that he cannot drink milk or touch eggs, that it is all in his mind, that milk and eggs are essential health foods, and that he must eat and drink what is put before him. Not infrequently the result of this is that the patient has a needlessly stormy convalescence after an operation, and the nurses are kept busy giving enemas and otherwise trying to empty the badly distended bowel.

When patients say to the physician, "I wish you would give me a diet," his answer should often be, "Without knowing your particular idiosyncrasies, I can as easily fit you with a diet as, without measuring your body, I could fit you with a suit of clothes."

Today there must be hundreds of patients with puzzling flatulence, bloating, indigestion, diarrhea, abdominal pain, mental depression, and headache, who could be cured overnight if only someone would find out what they must not eat.

Many persons, of course, do know of one or two idiosyncrasies—milk, perhaps, causes nausea and flatulence; strawberries cause hives; or shellfish cause vomiting and purging—and the fact that a person

has discovered such sensitiveness to a few foods should always raise the question as to whether careful investigation might not reveal other foods that should be avoided.

Furthermore, the person who knows that he must not touch eggs will usually not refuse angel food cake and custards, and a man who knows he is highly sensitive to corn will continue eating cornstarch pudding, corn syrup, candy made from corn sugar, foods fried in corn oil, and mayonnaise made with corn oil.

What usually confuses the patient and makes the search for the offending foods difficult is the fact that such foods are so often among those that are eaten every day. Because of this, the discovery of the trouble-makers may require a considerable amount of detective work, much of which requires the intelligent and patient co-operation of the sufferer.

Offending articles of diet should be sought for particularly when the patient suffers occasionally with hives, hay fever, or asthma, or when he has relatives who suffer with these allergic troubles. Suspicion will also be aroused when the symptoms are largely those of a sensitive colon—that is, soreness and burning in the lower part of the abdomen, flatulence, and the passage of mucus in the stools. In severe cases there may be migraine, mental dullness and depression, abdominal pain, diarrhea, nausea, hives, and rarely, irritation of the bladder or sudden swelling of a joint.

Always, of course, a careful physical and roentgenologic examination should be made in order to rule out the presence of intestinal parasites or of organic disease in stomach, gallbladder, or bowel. Since skin tests, although often helpful in finding the causes of hay fever and asthma, are seldom of value in identifying harmful foods, the search for these foods must be carried on in one or the other of the following two ways:

Diary method When the indigestion comes in attacks at intervals of weeks or months, the cause may be found by making a written record each time of all the unusual foods, not eaten every day, consumed in the 24 hours preceding an upset. It should be remembered also that trouble can arise from partaking too freely or too continuously of some food which is harmless if eaten in moderate amounts or for only 1 or 2 days.

This record may ultimately show that the attacks of discomfort were usually preceded by the eating of a certain food. If a slighter degree of

suspicion be thrown on some other foods, the patient must try to settle the doubts by eating heartily of these foods and recording the results. A list might also be made of the foods, obviously harmless to the individual, which were eaten when digestion was normal during the intervals between upsets.

In the patient's diary note must be made also of the incidence, before attacks, of unusual fatigue or emotion, or of constipation or migrainous headaches, or of eating when distraught or angry or in a hurry. At times also it will be discovered that an acute intestinal upset which at first appeared to be due to the eating of some particular food was in reality merely an early symptom of an oncoming cold.

Elimination method When the distress is present after every meal or when it comes every few days, the problem of finding the offending food or foods must be simplified by reducing the number of possibilities.

The simplest method would be to ask the patient to fast for a week. If the distress continued under these circumstances, one would know that food was not the cause, or at least not the principal cause. If the distress ceased, various foods could then be tested one by one and a diet finally made up of those foods which did not give distress.

Since many patients are undernourished and in no condition to stand a fast, and since others would object to such deprivation, the next best thing is to begin with one or more foods chosen from the list of those that seldom give trouble.

ALVAREZ'S ELIMINATION DIET

Alvarez usually restricts the diet at first to the following foods:

Lamb	Butter	Canned pears or
Rice	Sugar	Gelatin

He uses these only because experience has shown that few persons are sensitive to them.

No pepper or sauces of any kind may be used on the meat, no cream may be used, and the only drink allowed is water.

Obviously soda-fountain drinks, candy, and even chewing gum must not be touched. Every added substance put into the mouth complicates the problem.

Breakfast may consist of a lamb chop with puffed rice, rice flakes,

steamed rice with butter and sugar, or rice cakes fried in a little butter.

Luncheon may be made up of a lamb chop with rice and canned pears.

Dinner is the same as luncheon.

If within the next 2 days the symptoms disappear on this diet, the problem is practically solved. All that then remains to be done is to add one food at a time, testing it for a day and keeping a record of what happens. Among the foods with which Alvarez usually experiments during the succeeding two weeks are:

Potato	Asparagus	Oatmeal
Cream	Carrots	Melba toast, thin
Beef	String beans	

Toast, consisting largely of dextrin, will sometimes be tolerated when plain bread is not.

Next, bread may be tried and also mush made from wheat. If an attack of indigestion or migraine follows, the patient will then stop eating wheat and will go back to the basic diet for several days so as to allow time for elimination of the harmful substances from the body.

A little later he may try taking 1 glass of milk a day. If this distresses him, he can be fairly sure that he must give up milk. If, on the other hand, he finds that he is only moderately sensitive to this food, he can take a small amount each day, and he probably can use some cream. He may also find that he can partake freely of fermented, boiled, canned, or dried milk and cottage cheese.

If the patient is sensitive to milk, experiments will be necessary to determine how much milk he can take when it is incorporated in puddings, soups, cream sauces, ice cream, or custards.

The patient may next test eggs to see whether he can safely eat 1 or 2 or as many as he likes. Always the experiment should be repeated several times.

Temporary setbacks If the symptoms continue while the patient adheres to the diet of lamb and rice, the problem becomes more difficult. It then is to be feared that at least one of the foods being eaten is causing trouble, and a search must be made for the offender. The other possibility is that the symptoms complained of are not due to food sensitiveness and cannot be relieved by any diet. Usually it is best then to ask the patient to change to another elimination diet. He can go for a day on rice and gelatin; and, if that does not work, he can try beef

and potato. If that does not work, he can be kept for 24 or 48 hours on water alone.

If with such fasting his symptoms do not clear up, there is not much probability that any good can come from any form of dieting. Rowe believes that it is advisable to continue the elimination diet for even a month, but Alvarez cannot accept this view. Only in cases of migraine, eczema, and perhaps asthma may the physician have to keep the patient for 2 weeks or so on an elimination diet, and then it will have to be more liberal. For example, Alvarez then may use beef, lamb, rice, oatmeal, arrowroot, butter, sugar, white potato, carrots, string beans, asparagus, canned pears, gelatin, and perhaps applesauce.

Alvarez feels strongly that elimination diets should not be kept up too long. He found by questioning many patients that in most cases the distress due to eating a food follows in a few hours, and his impression is that when the patient is no better after 24 hours on a diet, it is rarely of any use to keep him on it any longer.

In choosing an elimination diet, the physician can occasionally be helped by the fact that the particular patient's skin reacted positively to certain foods. Ordinarily, skin-testing for foods is of little value, and often the indications given are false. This is the experience of many men.

Certainly no patient should ever be put on a highly restricted diet and left on it simply because his skin reacted to certain foods. Every food suspected should be tested carefully, and if the patient gets no better on withdrawing it and no worse on stuffing himself with it, the skin reaction must be disregarded.

If on elimination diets the patient continues to be distressed, the chances are that his trouble is not due to food. If he fusses and frets and has not enough interest and self-discipline to carry out the tests for even 2 days, the diagnosis of neurosis is far more probable than that of food allergy.

During the progress of these tests, some constipation should be expected and disregarded because the diet is almost free from residue. If the patient feels that he must have a bowel movement every day, he may take an enema of a quart of warm water to which is added a level tablespoonful of table salt. The use of agar, bran, paraffin oil, and all other laxative substances must be stopped while the tests are being made.

The most common offenders In the search for offending articles

of diet, the following table may be found helpful. It shows, in the order of frequency mentioned, the foods which 500 consecutive patients who went through Alvarez's office knew that they could not digest with comfort. If the whole list were to be published, it would be found to contain almost every food eaten by the average American.

TABLE I

FOODS THAT GAVE MORE OR LESS DISTRESS TO 500 PERSONS

	PER CENT		PER CENT
Onions (usually raw)	27	Corn	7
Milk, cream, ice cream	26	Pickles and sour foods	7
Apples (raw)	26	Bananas	7
Cabbage (cooked)	25	Peanuts	6
Chocolate	18	Oranges	6
Radishes	17	"Sweets"	6
Tomatoes (more often raw?)	15	Spices	6
Cucumbers	13	Cheese	5
Eggs	13	Peppers	5
Fats, greasy and rich foods	12	Salmon	4
Cantaloupe	11	"Fruits"	4
"Meat" and beef	11	"Nuts"	4
Strawberries	10	Prunes	3
Coffee	10	Peas	2
Lettuce	8	Potato	2
Dried beans	8	"Coarse foods"	2
Cauliflower	8	Fish	2
Watermelon and "melons"	8	Chicken	2
Pork	7	104 other foods	1 or less

Rowe, who depended largely on skin tests for his detective work, came to the conclusion that the most commonly harmful foods are:

Wheat	Tomato	Pork
Eggs	Orange	Carrots
Milk	Cauliflower	Bananas
Chocolate	White potato	Strawberries
Cabbage	Oats	Walnuts

Rowe and other students of food allergy place wheat at the head of the list. Alvarez remarks, however, that if this be true, thousands must be unwittingly poisoning themselves with it, for out of more than

500 patients he found only 4 or 5 who had discovered that they were sensitive to it.

One of the most interesting discoveries in recent years is the fact that chocolate is so often harmful. It is particularly responsible for bringing on occasional attacks of migraine.

Strawberries and tomatoes are the foods most likely to produce irritation of the skin.

In some cases of diarrhea the symptoms are kept up by the giving of milk because the patient is sensitive to it. Similarly, a number of patients with ulcer and tuberculosis do badly with milk, especially if they have had it in abundance for months. Experiments in Germany have indicated that even healthy people are likely to have trouble if more than 1.5 or 2 liters of milk are given each day. When larger amounts are taken, the digestive powers of the intestine are strained, and a little of the milk goes unchanged into the blood.

With other foods such as beef, if large amounts are eaten, small amounts of unchanged protein probably get into the blood so as to sensitize the patient. Thus, a young man who had always enjoyed dates and digested them with ease once ate at a sitting a few pounds that were left over from a fraternity party. Ever since, if he attempts to eat even half a date, he becomes quite ill.

Alvarez is sure that only some of the foods which commonly distress persons injure them in an allergic way. He feels also that it is not always the protein in food which causes the trouble, but rather, perhaps, some irritant resin or glucoside or other druglike substance, which, if extracted and concentrated, would act as an emetic or purge.

The patient who cannot co-operate Obviously, when trying out elimination diets, results can be obtained only with intelligent, co-operative, and sensible patients. Not infrequently an attempt to use an elimination diet will reveal clearly a peevish, unstable, unreliable, and unreasonable sort of person whose complaints are exaggerated, and who is not likely to be made over and cured by any treatment now known to science.

A word of caution Even when the patient obtains prompt relief on an elimination diet, the good result may not be due to the abstention from a few foods. If the patient has been to a clinic or hospital, his improvement may have been due to rest from work and worry, to an escape from various annoyances, to the securing of better sleep,

to the elimination of bulk and roughage from the diet, or to relief from constipation.

It is important, therefore, that after a few months the patient should experiment again with the apparently harmful foods. Often he will find that he has regained the ability to eat some of them. Most of us tend to convict foods unjustly and on insufficient evidence, and hence, often the supposed mischief-maker should be given another chance. The patient should try to avoid that common tendency of dyspeptic persons to give up one article of diet after another until few are left and health is impaired.

THE PROBLEM OF FEEDING HIGHLY FOOD-SENSITIVE PERSONS

The problem of feeding persons who are highly sensitive to several of the commonly used foods is often a difficult one, and as yet it has not been studied as it should be. Take, for instance, the problem of a child who wheezes all night or breaks out with eczema if he touches any wheat, egg, beef, or potato. The mother needs much help and instruction if she is to keep the child well nourished and growing properly.

And, as if this mother's problem were not bad enough already, when she finds a number of substitute foods she is likely to give them in such large amounts every day that soon she sensitizes the child to them. In order to avoid this, the available foods are best given in rotation and never in large amounts at a time.

Fortunately, the rotation of foods is helpful in yet another way. Let us suppose a person is only moderately sensitive to egg. He may then eat an egg twice a week without much discomfort, but if he were to take one every day he would soon be uncomfortable. Because of these facts, highly allergic persons should learn the trick of rotating the foods to which they are slightly sensitive. Then they will not have to avoid them entirely.

One great problem of the highly allergic person is to find all the places in which his enemy food may lie hidden. For instance, a woman highly sensitive to corn will get into difficulties every so often when eating canned food or candies sweetened with corn sugar. Similarly, a child who is highly sensitive to wheat may get to wheezing after eating a cookie which the mother had been led to believe was made without wheat.

The time has come when purveyors of food must put on cans and packages a list of the constituents of the contained food. Already in a few large cities bakers are supplying highly allergic patients with breadstuffs made from the starches derived from rice, rye, potato, barley, or lima or soybeans.

For some of his most sensitive patients Alvarez has been reaching out to the ends of the earth to secure new foods which theoretically should not disturb an American because he has never eaten them and therefore has never had an opportunity to become sensitized. Actually, sometimes they do cause trouble.

Patients in large cities can sometimes find useful new foods in the stores that cater to immigrants.

The garbanzo, or chick-pea, is a tasteful and very useful food. Rowe often uses flour made from the lima bean. Taro flour from Hawaii should be tried. Some day flour will probably be made from the Polynesian breadfruit.

Doubtless more use will be made by allergists of the several starches now sold under the name of arrowroot, tapioca, and sago. These substances cooked in applesauce can be taken by many sensitive persons. Unfortunately for many sensitive persons, these starches cannot be cooked in the usual way with egg and milk.

Few sensitive persons can eat raw apple, but many can take cooked apple. Persons highly sensitive to butter or cottonseed or corn oil must experiment with some of the several commercial oils available for cooking and used largely by foreigners.

DIET FOR ULCER OF THE STOMACH AND DUODENUM

Occurrence of ulcer In the United States about 10 ulcers in the duodenum are encountered to 1 in the stomach. The dietary problems involved in the treatment of the two types of ulcer are much the same, no matter where the lesion is situated.

Type of diet A diet for ulcer must not be rough and scratchy because during healing the first membrane that spreads over the floor of an ulcer is exceedingly thin and delicate. It has been shown in animals with experimentally produced ulcer that the cure of the lesion can be expedited by a smooth, soft diet and can be retarded by a rough one.

The diet should not contain substances that give rise to large amounts

of acid juice or a juice with an unusually high concentration of hydrochloric acid, unless at the same time it is exceptionally efficient in combining with the acid and rendering it harmless to the mucous membrane. It is for this reason that the patient with ulcer should not take soups made of either vegetables or meat, should not eat much fish, particularly salted or smoked fish, and should not drink coffee or Coca-Cola.

Meat produces a strongly acid gastric juice, but it combines so well with the juice that theory permits its use, and practically, patients with ulcer seem to do about as well with meat as without it.

The use of *fat* is probably advisable. It reduces the amount of acid at the beginning of the digestive period and recent researches indicate that it works better than alkalis in reducing the acidity of the duodenum. It tends to prolong gastric emptying, which might be hard on a gastric ulcer. In actual practice, much fat in the form of cream and egg yolk has been incorporated into almost every diet that has ever been devised for the cure of ulcer.

Necessity of frequent feeding The essential feature of any dietetic treatment of ulcer is the giving of food at frequent intervals. In the average case, in which the symptoms are mild and easily controlled, it may suffice to give 3 additional feedings, one in the middle of the morning, one in the afternoon, and another at bedtime; but in severe cases food may have to be given every hour. Often, however, when the need for food is as bad as this, the patient must undergo an operation.

The reason for frequent feeding is twofold. First, the food tends to combine with the acid so that it will not burn into the floor of the ulcer. Second, the presence of food in the stomach protects the mucous membrane from injury by the acid, a fact suggested by experiments on animals.

Peptic ulcer appears to be a disease of nervous origin, occurring commonly in tense, nervous persons. Unfortunately, in these people messages from the overactive brain keep the stomach secreting far into the night when it should be quiet, with the glands at rest. Hence it appears that frequent feedings are often most needed between the hours of bedtime and perhaps 2 A.M.

Development of ulcer treatments In the earliest treatment of peptic ulcer, certain German physicians forbade all food by mouth and endeavored to give some by rectum, hoping in this way to put the stomach

absolutely at rest. Soon, however, they discovered that the starvation treatment would not accomplish this nor would it put a stop to the secretion of highly acid juice.

Rectal feeding was consequently abandoned, since it was found that very little food was absorbed through the colon and as a result the patients were more or less starved.

Ultimately von Leube devised a treatment for peptic ulcer which remained the standard method for many years. It was superseded by the Lenhartz Diet, which was still later modified by Sippy, whose method is still in use.

Because of the expense and inconvenience entailed by the hospitalization demanded by the Sippy method, and since the cures it effects are in most cases not permanent, Alvarez has devised an ambulant treatment for ulcer.

Indications for the type of ulcer treatment A gastric ulcer, especially when it is large and when the symptoms have appeared suddenly in an older person who previously was well, should always be looked on as carcinomatous until it is proved to be benign.

If it is treated medically, the results must be checked every two weeks with the roentgen ray or the gastroscope. If the ulcer is benign, the crater should rapidly fill in and disappear. If it does not decrease in size, the patient should be operated on. Even when it tends to heal, one cannot be sure it is not carcinomatous.

Duodenal ulcers fortunately do not become cancerous, and cancer of the duodenum is a rare disease. Patients with duodenal ulcer are best treated medically if the symptoms are not severe and if they are easily controlled by diet, rest, and alkalis. Operation is usually resorted to when the symptoms are poorly controlled by diet and rest, when the patient is becoming incapacitated by suffering and inability to sleep, and when complications arise such as pyloric obstruction or repeated hemorrhages.

Even though the X-ray may show indications of ulcer, it does not of necessity follow that an active ulcer is present. When there are no symptoms of ulcer or the symptoms are typically those of a neurosis, the deformity of the duodenum as seen by the roentgenologist may be due purely to an old scar.

Occasionally an ulcer diet can be used for diagnostic purposes. If the symptoms are due to an uncomplicated ulcer, they should clear up as soon as the patient takes food between meals. *There is no sense in*

keeping up a diet for ulcer for weeks after it is apparent that it is not doing any good.

It is highly important that patients with ulcer avoid those forms of exercise which cause abdominal straining and pulling on the duodenum. Some persons with ulcer can get well only by changing from an active to a sedentary type of occupation.

Alvarez's ambulant treatment If a patient is to stay at work, he must have 2 or 3 good meals a day so as to maintain his strength. Some patients are thin and below par, and any treatment that keeps them that way is undesirable. One of the worst things is to keep patients with ulcer on a milk diet for months at a time. Anemia sometimes develops in such cases.

In many cases in which a tractable form of ulcer is present the type of food taken does not seem to have much influence on the healing of the lesion, so long as mental and physical rest is secured and food is taken between meals.

For the average patient with mild symptoms of ulcer and for the man who will not rest or who cannot afford to go to a hospital, the smooth diet may be prescribed, interdicting only soups made of beef stock and vegetables, chowder, smoked and pickled fish, coffee, and the excessive use of salt, pepper, and spices. Meat in moderate amount is allowed.

For food between meals, a mixture is prepared in the morning, consisting of 1½ pints of milk with either one-fourth or one-half pint of cream, depending on the patient's need for extra calories, and, if he stands eggs well, the yolks of 2 eggs. If desired, a little sugar and vanilla may be added.

If milk is not well tolerated, the material for frequent feedings should consist largely of a thin gruel made from any cereal, to which perhaps some cream and sugar are added.

The mixture is chilled and carried in a thermos bottle. A glassful can be taken at 9:30 A.M. and at 2 and 4 P.M., also at 8 P.M. and again just before going to sleep. Sometimes a glassful is taken instead of lunch, together with a few crackers. The usual breakfast and dinner are taken, made up of foods from the smooth-diet list.

If the pain returns within 1½ hours after eating, the extra food must be taken every hour. Usually, however, when the interval is as short as this, the ulcer is becoming intractable, and the patient will soon be forced to undergo operation.

If the patient is traveling, he can usually get a milk shake or a malted milk, or he can carry a box of crackers.

For those who cannot stop work to secure food, malted-milk tablets are most helpful. Eight or 10 will usually stop the hunger pain and protect the ulcer from injury by acid.

Most of the injury by the gastric juice to the ulcer is probably done at night, and this can be lessened by a midnight glass of the milk-cream mixture. The patient should set an alarm clock to waken him, and should always have milk beside his bed.

Since it is known from experiments on animals that even an acute ulcer takes about a month to heal, the patient should continue taking the food between meals for at least a month after the symptoms stop. Human nature being what it is, most patients will doubtless be inclined to stop as soon as they get relief.

It probably does not pay to continue with the diet for 6 months or a year because so often severe symptoms return when patients are dieting more strictly even than seems wise or necessary.

Von Leube's ulcer treatment This treatment was for many years the standard method of dealing with peptic ulcer but is now obsolete. Its essential features were a carefully planned dietetic regimen and rest in bed.

Lenhartz's ulcer treatment The Lenhartz mixture of milk, egg yolk, and cream is still the most important part of many of the diets that are used today.

Sippy's ulcer treatment Most gastro-enterologists now advocate the Sippy treatment or some modification of it. This treatment is needed for the patient whose ulcer is causing much pain and trouble, or it can be tried once or twice by the patient who can afford to go to bed for a month or more. It often heals the ulcer that is present, but another may soon form. Because of the expense and inconvenience entailed by the hospitalization which it requires, it can be used for only a small fraction of ulcer cases.

The basic principle of the Sippy treatment is to try to maintain at all times a practically neutral stomach. Sippy reasoned that without hydrochloric acid there can be very little peptic activity, and that under such conditions an ulcer should heal. In order to be sure that the juice is neutralized, a sample of the stomach contents must be removed from time to time and tested.

Unfortunately, a number of careful students of the subject have had

to confess their inability to keep the stomach neutral, even with the most strenuous treatment. While sodium bicarbonate tends first to neutralize the acid, it serves later as a stimulant to further acid production. Moreover, while a fair degree of neutrality can be maintained during the day, unless special efforts are made at night, the acid gets out of control then.

Sippy treatment for nonobstructing ulcer The patient should be confined to bed for approximately 3 weeks. This period should be longer in cases of deep penetrating or bleeding ulcers.

The basis of the treatment is milk to which cream has been added, not only to increase the number of calories, but also to help in lowering the gastric acidity. Gradually various bland foods are added, and the treatment is kept up usually for several months.

Three ounces (90 c.c.) of a mixture of milk and cream are given each hour from 8 A.M. to 7 P.M. inclusive, thus supplying in the 12 feedings about 1500 calories, or sufficient to maintain a patient fairly well in bed.

At intervals midway between these feedings enough alkali is given to neutralize the free hydrochloric acid in the stomach. After the last feeding in the evening alkalis are administered every half-hour for 4 doses, with the idea of maintaining neutralization during the night.

At the end of 2 weeks the patient should be taking every 2 or 3 hours, in addition to the hourly feedings of milk and cream, such digestible foods as:

Eggs, poached or soft-boiled
Cereals, thoroughly cooked
Rice
Oatmeal, strained
Puréed vegetables
Potatoes, baked or mashed, with butter and cream
Soft toast
Custard
Gelatin
Blanc mange
Sponge cake
Fruit juices

In some cases the solid foods may replace some of the milk and cream feedings.

During the early weeks of treatment the total quantity of food given at any one feeding is less than 6 ounces.

After from 3 to 6 weeks of adherence to this very bland diet, more latitude is allowed. The patient may return to his usual occupation and may take 3 meals daily, consisting of:

Any well-cooked cereal, except those containing bran
Oatmeal, no longer strained
Asparagus tips
Beets
Carrots
Cauliflower
Squash
(These vegetables, if well cooked, need not be puréed.)
Bacon, lamb, and fish, in small amounts
Cooked fruits
Simple puddings
Cottage cheese
Gelatin
Ice cream

The patient should avoid:

Raw fruit	Nuts	Beef
Salads	Pickles	Most soups
Cabbage	Spices	Alcohol
Apples	Condiments	Tobacco
		Coffee

Use of alkalis In Sippy's clinic the use of large amounts of sodium bicarbonate was abandoned several years ago because it tended to produce alkalosis, and more bismuth was used perhaps with calcium carbonate and enough magnesium oxide to avoid constipation.

Tribasic phosphates of calcium and magnesium are thought by some to have advantages over the other alkalis. They do not seem to be toxic. The average hourly dose of tribasic calcium phosphate is about 20 grains (1.3 grams) and of the tribasic magnesium phosphate, 15 grains (1 gram).

As a rule older patients do not tolerate the large doses of alkali so well as do the younger ones, especially if renal function is not good. But occasionally even a young person will not tolerate large amounts of sodium bicarbonate. The first symptoms indicating trouble are usually headache, thirst, mental depression, and loss of all desire for food. As soon as such symptoms appear, all alkalis should be withdrawn for from 3 to 4 days.

Today, in many institutions, the favorite antacid is some proprietary preparation of aluminum hydroxide. According to Ivy, the preparation of aluminum hydroxide should contain *phosphate* because aluminum tends to take phosphorus away from the body, and this is undesirable.

Belladonna is sometimes used, but in order to lower gastric acidity it must be given in amounts so large that the patient is uncomfortable. It is not possible to maintain an acid-free stomach with belladonna alone.

Treatment of patients with pyloric obstruction According to Ralph Brown, the failure to recognize the presence of pyloric obstruction and to see that this calls for modifications in the treatment is largely responsible for many of the poor results obtained. In the presence of obstruction, it is essential that at night the stomach be emptied by tube and washed so that the mucous membrane can get some rest and the patient some sleep. The washing should be done first about 9:30 P.M. and if necessary again at midnight. The tribasic phosphates of calcium and magnesium can be given in doses of 1 dram (4 grams) every 2 hours during the night. Sometimes the stomach must be washed out again at 4 A.M. Solutions of sodium chloride and glucose must often be given by vein to help overcome the dehydration and alkalosis.

In many cases this treatment will relieve the pyloric spasm, the inflammatory swelling and edema will go down, and the sphincter will open fairly well. But even then the patient may have to be operated on to obtain permanent relief, and this operation should be performed while he is in good condition. One should not wait until he has another attack of pyloric obstruction.

Fluoroscopic examination does not help in determining when an ulcer is healed because once the duodenum is badly scarred and puckered it stays that way throughout life. Brown believes that ulcer management should be continued for 6 or 9 months or a year.

Success or failure depends on the amount of intelligent co-operation that can be secured from the patient. He must understand that he has a chronic disease which is likely to return from time to time, sometimes even after an operation has been performed.

Treatment of hemorrhage Fortunately death from hemorrhage, especially in the case of younger patients, is rare. The patient must be put absolutely to rest. Formerly no food was given, but today probably most gastro-enterologists agree with Menlengracht that the danger of knocking the soft clot out with food is less than that of having it digested out by unbuffered acid. Hence most physicians today give the usual frequent feedings even though the patient has bled badly.

It is doubtful whether there is any advantage in having the milk mixture iced. It is the custom, but there is no scientific reason for doing so,

and so far as is known patients do just as well with the food given at room temperature.

Treatment with an indwelling nasal tube The great defect in the treatment of patients with severe types of ulcer is the failure to control the high acidity which so commonly persists during the night.

In order to avoid waking the patient for night feedings, thus interrupting the rest he needs so badly and so retarding the healing of the lesion, Winkelstein and others have treated patients with a small Levin tube passed through the nose into the stomach or jejunum. Through this tube a mixture of milk and alkali drips into the stomach. The results of this treatment have been satisfactory in the case of patients who can tolerate the tube. Obviously this work can be done only in a hospital. A number of new creamy drugs made from aluminum, silica, magnesium, and other substances are now being used for such drip treatments.

Jejunal feedings in cases of ulcer Occasionally when a palliative operation must be performed on a patient who has become greatly weakened and emaciated because of pyloric obstruction, or on a patient who has a gastric ulcer so high on the lesser curvature that it cannot be removed surgically, the surgeon will bring up a loop of jejunum and make a fistula through which feedings can be given.

For such feedings many physicians use a milk, cream, and egg mixture. After some research Scott and Ivy [2] devised the following mixture which they found highly suitable for maintaining dogs in good nutrition over long periods of time.

	CUBIC CENTIMETERS	CALORIES
Water	1500	. . .
Cane sugar	75	307
Peptone (dried)	50	205
Wheat flour	150	545
Milk, whole	1000	716
Cream, 20%	500	900
	3275 (Approx.)	2673 (Approx.)

This mixture contains about 80 calories for each 100 c.c. In each 100 c.c. there are 3.5 grams protein, 8.1 grams carbohydrate, and 4.3 grams fat. To this should be added as much salt as would be used if the food were being taken by mouth. If desired one might also add a little

[2] *Journal of American Surgery*, Vol. 93, pp. 1197-1201.

iron to make up for the deficiency in the milk, or one might add a com plete salt mixture such as is given to rats.

To supply extra vitamins, one may add 5 c.c. of emulsified cod-live oil or 2 drops of viosterol, 1 egg yolk, 0.5 gram of vitamin B concen trate (Harris), 0.2 gram of yeast foam, 0.2 c.c. of carotene extract, an 10 c.c. of neutralized tomato juice. The amount of tomato juice shoul be reduced if it produces diarrhea.

The mixture must be run into the bowel slowly and at exactly body temperature. Otherwise there is likely to be a certain amount of colicky distress and nausea and occasional vomiting. The material is generally given with a Murphy drip, perhaps with a lamp bulb in the fluid to keep it warm.

The mouth and teeth should be cleaned each day with the greatest care. Sometimes also the patient should chew gum to prevent inflam-mation in the parotid gland.

PSEUDO-ULCER

For every few patients with true ulceration of the stomach or duo-denum, there will be another one with symptoms resembling those of ulcer but without an ulcer which can be demonstrated, either with the roentgen ray or at operation. Often the expert will suspect from the history that the patient has not a true ulcer.

The symptoms will often be continuous instead of intermittent, the relief obtained by taking food may not be typical or entirely satisfactory, there may be distress in the morning before breakfast, and rarely will there be any waking at night. Furthermore, after years of frequent distress, the patient will not have come to any bad end. Occasionally now, with the gastroscope, a lesion can be found in the stomach of such persons, but commonly it cannot.

Cause The main cause for this syndrome seems to be the presence of the same type of nervous tension and gastric hypersecretion which so commonly goes with actual ulceration of the stomach and duodenum. Often the main trouble is constipation; rarely it is sensitiveness to some food. Sometimes an attack is ushered in by a cold. Pseudo-ulcer is not a forerunner of real ulcer. At times there may be some gastritis or duo-denitis.

Dietetic treatment The dietetic treatment of these patients must be very much like that of patients with ulcer. A smooth diet is given with

instructions to take food between meals. In addition the patient may need some exhortation to live a quieter and, if possible, a less harassed life. The bowels should be kept moving, preferably with enemas of physiologic saline solution. Care should be taken to see that the patient is not eating foods to which he is highly sensitive.

CANCER OF THE STOMACH

There is little that can be accomplished by diet in many cases of gastric cancer because the pylorus is markedly obstructed, and no matter what is given by mouth it will stay in the stomach undigested and unabsorbed. When the pylorus is still patent, many of the patients will eat everything with a fair amount of comfort. Curiously enough, some complain of a distaste for meat.

Obviously, if the pylorus is partially obstructed it is important not to give rough food or food that cannot easily slip through the narrowed passageway. This is particularly important in old people, many of whom have no good chewing surface. Others have unsatisfactory plates, and others are given to bolting their food without chewing. For this reason an effort should be made to prescribe a diet in which the meat is ground and vegetables are puréed. Salads should be interdicted, and fruits should be given cooked. Fruit juices, of course, can be taken uncooked.

In many patients with cancer of the stomach the early symptoms are typically those of ulcer; and the patient may then, for a time at least, be comfortable on an ambulatory type of ulcer treatment.

Because many of these patients tend to lose weight rapidly, the dietitian should try to give them as much food as they can digest with comfort. Many are fairly comfortable only when they eat very little of anything.

ACUTE OR TRANSIENT INDIGESTION WITH OR WITHOUT ACUTE GASTRITIS

Cause There are a number of types of acute or transient indigestion, the causes of which are not always clear. In older persons acute indigestion is often due to a slight stroke, the nature of which is not recognized at the time. The patient will suddenly become dizzy and nauseated and may vomit. Some food recently eaten will be blamed, but later it will

be noticed that changes in character have taken place, and finally one or more severe attacks, with weakness of some of the muscles, will show the nature of the disease at work.

Not infrequently also an attack of acute indigestion, which is at first blamed on the eating of some food, will be found later to have been an episode in the course of chronic cholecystitis.

Acute indigestion of a violent type with diarrhea and vomiting is commonly due to the eating of food which is contaminated with bacteria. When a man becomes seriously ill following the eating, let us say, of hamburger steak, one can generally prove, if any of the meat is still available, that it is swarming with bacteria which were not killed in the cooking.

In other cases a digestive "storm" will be due to the eating of food when the patient was greatly fatigued or upset.

Still another cause of acute indigestion is the eating of foods to which the patient is highly sensitive, perhaps in an allergic way. Many people live out their lives without discovering that their indigestion is due to their inability to digest any great amount of milk, eggs, chocolate, or some other food.

Dietetic treatment In all these cases it is well to make the patient go without any food for at least 24 hours. During this time much water may be taken. Occasionally a dose of castor oil will be helpful, but often the patient's bowel has already cleaned itself out so thoroughly that there is no need for further purgation.

If the upset has been severe, the patient had best be kept for another day or two on partial starvation. He may perhaps be allowed fruit juices or lemonade containing much sugar. Pineapple juice is a convenient sugar-containing food.

The next day he may have some beef or lamb with rice, butter and sugar, or a little cream. Alvarez uses these foods because experiment has shown that they leave the least residue for the irritated colon. If they are well borne, he prescribes a smooth diet for a week or two until the patient seems to be well again.

When patients return quickly to a full diet, the bowel may be unable to recover its digestive and absorptive powers. A vicious circle may then be set up and the indigestion may continue for months.

CHRONIC INDIGESTION OFTEN THOUGHT TO BE DUE TO CHRONIC GASTRITIS

With the new widespread use of the Wolf-Schindler gastroscope, there has been a great increase in interest in gastritis. A certain amount of gastritis, or what is thought to be such, associated at times with shallow ulcerations, is being observed in many patients suffering with puzzling forms of indigestion.

As yet it is not clear in many cases what relation the findings have to the symptoms. The syndromes of the several types of gastritis, granting that there are such syndromes, have not yet been clearly recognized.

Naturally, as yet, there is no great scientific basis underlying treatment, and gastro-enterologists can only feel their way. In the worst cases, and especially when there are shallow ulcerations, the best treatment probably is that of the type which would be used if a large ulcer were present.

We know that in some cases of fairly severe gastritis a cure, demonstrated by gastroscopic examination, has been obtained with rest, and the use of an ulcer type of regimen perhaps fortified with liver extract and extra vitamins of the B group.

HYPERSECRETION AND HYPOSECRETION OF THE STOMACH

There is no good scientific basis for any dietetic treatment of hypersecretion or hyposecretion. Achlorhydria is a common peculiarity, especially among older patients, and in most of them it does not seem to be associated with any definite symptoms.

Not infrequently the patient who complains of hyperacidity is found to have either a normally acid or a subacid stomach. The burning may be due to the fact that a normally acid gastric juice which cannot be felt in the stomach is being regurgitated into the esophagus, where it can at times be felt.

The gastro-enterologist no longer treats hyperacidity or hypoacidity as such. If they seem to have anything to do with the production of the symptoms complained of, he will be inclined first to look for some underlying disease such as ulcer or anemia and then to treat that. In most cases he will not be concerned about minor variations in acidity, since these are to be found commonly among normal people who have no trouble with digestion.

PSEUDO-CHOLECYSTITIS

For every patient with disease of the gallbladder, there is another who has symptoms suggesting the presence of cholecystitis. In rare instances there will be attacks which are almost as severe and painful as those produced by gallstones. Usually the hepatic region is tender, and the patient complains of flatulence and bloating. X-ray examination of the gallbladder will show it to be functioning normally, and removal of such a gallbladder usually fails to give more than temporary relief.

Cause The disease appears often to be due to some form of hepatitis or cholangitis or injury to the hepatic cells. Sometimes the pain is due to a sort of fibrositis in the chest wall, and in many cases the disease is a psycho-neurosis.

Dietetic treatment In a few cases complete relief has been afforded to the patients by removing one or more disturbing foods from the diet. Just as in cases of cholecystitis, these people are often much better if they can be induced to eat moderately and to take small meals. It is the large meal or the meal composed of rich foods that commonly causes them trouble.

NERVOUS OR FUNCTIONAL INDIGESTION

There are many types of nervous and functional indigestion with many causes. Obviously the most successful treatment will result from discovering the particular causes. One of the most important points to remember is that, if the patient's stomach and intestines are normal and the symptoms complained of are due largely to fear and worry, the logical thing to do is to insist that a general diet be followed.

THE OVERFEEDING DIET

One of the common problems encountered every day by the gastroenterologist is that of the frail, thin patient, usually a little woman who has no appetite and who claims that practically every food she eats distresses her. Often she will admit that even a glass of water can bring on bloating, belching, and abdominal distress. This admission, together with the fact that all foods produce distress within a few minutes, indicates that the trouble is not due to the quality of any particular food but simply to the fact that something has been put into the stomach which

starts an abnormal type of peristaltic wave. Often it means that the patient is eating when harassed, nervous, and tense, and in no condition either to enjoy food or to digest it.

It should be pointed out to such patients that for a time they will be just as badly distressed by one food as another, and that the discomfort occasioned by a large meal is not so much greater than that brought on by a small one. It is better that they eat and be distressed if by so doing they can gain in weight and strength and eventually get well. Often this is the only way in which they can regain health.

Miracles can sometimes be worked with these thin, frail, tired women if they can be placed at rest in bed under the care of a good, sensible, optimistic nurse, and a good dietitian who can supply food in a digestible and attractive form. These patients sometimes gain a pound a day for a month, so that when they come out of the hospital their friends hardly recognize them.

In order to succeed with an overfeeding cure, the diet should be smooth. What little digestive power the patient has must be conserved and used to digest only such food as has a high caloric value. Much cream and butter can be tucked away out of sight in a number of foods. Cream can go into cream soups, it can be added to milk, it can go with cereal, coffee, puddings, and fruit, and some can be used here and there in the cooking. Much butter can go on thin toast or on baked potatoes, and into the preparation of various dishes.

Curiously enough, after 3 or 4 days of such stuffing of a reluctant patient, an appetite may develop and the battle will then be won. Alvarez used to think that the putting on of fat was one of the most important parts of a rest cure, but in recent years he has come to look on the rest in bed and the relief of insomnia as even more important.

Many physicians believe it wise to add vitamins to an overfeeding diet. It seems, however, that any well-advised overfeeding diet is bound to contain plenty of vitamins and perhaps all the patient can use. The essential point is that any substance which may be distasteful to the patient be kept off the tray. It is best not to put all the food on the tray at one time, since that discourages and disgusts the patient. Needless to say, it is highly important that the tray be as attractive as possible.

Only in rare cases will it be necessary to give some of the first feedings by stomach tube. There are cases, however, in which this works well, especially when the patient is somewhat psychopathic. Sometimes with their mistaken idea that the stomach is the sole organ of digestion

these persons will accept food if they think the tube is going to carry it past the stomach and into the bowel. Those who are obstreperous will also behave better if they think that when they begin to eat willingly they will be excused from further intubation.

There is another type of patient who sometimes must be fed for a time by tube. This is generally a young woman who begins to regurgitate food within a few minutes after eating it. She can be cured only if she can be induced to restrain the desire to vomit and thus to teach the stomach again to tolerate the presence of food. Sometimes this process is accelerated if the stomach tube is being passed every day, and the patient is led to believe that this unpleasant form of treatment will be stopped as soon as there are signs of recovery. It is useless to operate on these women even when they do have, in addition to the nervous disease, an asymptomatic ulcer or a gallstone.

In recent years it has been found that some of these frail, emaciated women can be started on the road to recovery by giving perhaps 20 units of insulin before meals. This tends to give an appetite and to increase the body's demands for food. Patients sometimes gain weight under such treatment.

QUESTIONS FOR STUDY

1. What is a smooth diet? When is it indicated?
2. What foods are allowed in the Alvarez smooth diet?
3. Discuss the use and abuse of roughage.
4. What is food allergy?
5. Give two methods of identifying harmful or offending foods.
6. Discuss the elimination diet.
7. What are some of the foods which frequently cause trouble?
8. What type of diet is needed in cases of ulcer?
9. What is the essential feature of dietetic treatment of ulcer?
10. Discuss Alvarez's ambulant treatment.
11. What is the principle of the Sippy treatment?
12. Discuss pseudo-ulcer.
13. What causes acute indigestion? Discuss its dietetic treatment.
14. What is the overfeeding diet? When is it used?

9.

DISEASES OF THE INTESTINES[1]

In disorders of the intestinal tract, dietetics finds a very useful place. Many grave disorders of the intestines, both organic and functional, will respond to rational dietetics, often without the use of pharmaceutical preparations, although medication should be used whenever indicated. The functions of the intestines and the digestive, absorptive, and eliminative processes taking place within them are so well understood and thier specific relationship to the metabolism of food so well known that it is possible by proper control of the diet to regulate the processes that take place within the intestinal tract.

The small intestine is essentially an organ of digestion and absorption, whereas the colon is essentially an excretory organ. Digestion of food takes place largely in the small intestine and is considered complete when the intestinal chyme has passed the ileocecal valve. Absorption takes place largely in the small intestine and sparingly in the colon. Although the colon is in continuity with the small intestine, it has few physiological properties in common with it. The main function of the colon is the formation of feces and the ejection of them from the body. The term "small intestine" is associated with food, whereas the word "colon" is associated with feces.

Disorders of the small intestine usually manifest themselves by diarrhea, whereas disorders of the colon are manifest by either diarrhea or constipation. It is the presenting symptom which is the indication for the diet. Thus, if diarrhea is present, a low-residue, bland diet is given; if constipation is present, a high-residue diet is indicated. If fever is also present, such as occurs in typhoid fever, the diet is planned to meet the needs of the fever; if other complications are present, these must be taken into consideration. Among the clinical states that require special diets, the following may be mentioned.

[1] This chapter was prepared by Dr. Harry Gauss, associate professor in medicine, University of Colorado School of Medicine. Approved by Dr. Gauss, 1944.

ACUTE ENTERITIS

Cause Acute enteritis is due to a variety of causes, among which may be indulgence in distinctly irritating foods, unsanitary conditions, or the introduction of certain poisonous substances into the intestine.

Dietetic treatment Complete abstinence from food for 1 or 2 days is usually recommended. When acute symptoms have passed, soup and gruels made of barley, rice, or oatmeal may be given. These may often be made with milk. Toasted bread, crackers, and soft-cooked egg may be added gradually; and, if symptoms do not return, a little easily digested meat, such as scraped beef balls or lamb chop, with bread and butter. When diarrhea has entirely disappeared, baked or mashed potato may be given. Other vegetables should be added very carefully and at first in very small portions. Fruits, because of their natural laxative quality, should be avoided for a still longer time.

CHRONIC ENTERITIS

This disorder may be characterized by constipation, diarrhea, or alternating attacks of both.

Dietetic treatment The treatment depends upon the nature of the case. The meals should be given regularly, and good results are often obtained by giving food frequently and in small portions. Speedy cures are seldom effected, and the treatment requires much patience.

Test diet The test diet may be used to determine if possible whether there is any particular fault in digestion. The following is frequently used:

SCHMIDT INTESTINAL TEST DIET

Principles Easily digested foods, balanced diet, low residue.

Indications Diagnostic for diarrhea, therapeutic for fermentative diarrhea.

	PROTEIN (*grams*)	FAT (*grams*)	CARB. (*grams*)	CALORIES
Breakfast:				
Milk, 1 pint, 450 c.c.	14.8	18.0	22.5	319
or tea or cocoa with milk				
Vienna roll, 1, 45 grams	3.8	1.0	25.4	129
Butter, 7½ grams	0.0	6.3	0.0	59
Egg, soft-boiled, 1	6.6	6.0	0.0	83

10 A.M.				
Thick oatmeal soup, 150 c.c., strained, cooked with milk	13.1	12.1	32.7	300
Sugar, 7 grams	0.0	0.0	7.0	29
Dinner:				
Cream of potato soup, 125 c.c.	2.9	9.0	9.6	135
Beef, scraped, ¼ lb., 115 grams, slightly browned in pan	25.0	12.2	0.0	216
4 P.M.:				
Milk, 1 pint, 450 cc.	14.8	18.0	22.5	319
Vienna roll, 1	3.8	1.0	25.4	129
Butter, 7½ grams	0.0	6.3	0.0	59
Supper:				
Thick oatmeal soup, 150 c.c., strained, cooked with milk	13.1	12.1	32.7	300
Sugar, 7 grams	0.0	0.0	7.0	29
Vienna roll, 1	3.8	1.0	25.4	129
Butter, 7½ grams	0.0	6.3	0.0	59
Eggs, soft-boiled, 2	13.2	12.0	0.0	166
	114.9	121.3	210.2	2462

When the efficiency of the digestive enzymes has been tested, it is then possible to arrange a diet to suit the individual case. Examination of the stools to discover any undigested material should be carefully made, as this may lead to changes in the kind of food given. As these cases may extend over many months, the diet should be adjusted to supply the body need in calories, nitrogen, and mineral constituents. It is desirable to increase rather than decrease weight.

Foods allowed In cases of diarrhea, a nonroughage diet should be strictly adhered to, avoiding all foods that would be irritating to the intestines or that would stimulate peristalsis. In cases attended with constipation, a more liberal diet may be used, including fruits, green vegetables, and fats, but still avoiding very coarse foods and those known to cause digestive disturbances, such as sausage, lobster, cabbage, and cucumber.

DIARRHEA

Cause Diarrhea is a symptom of some underlying condition. It often results from a lack of acid in the gastric juice, although a hyperacid condition may cause the same trouble. It sometimes occurs when the

pancreatic lipase is inadequate for complete digestion of fat. It may come also from some peculiarity of nerve condition or from the toxic effect of a food substance.

Toxic diarrhea is seen in cases of chronic Bright's disease, typhoid, cholera, cholera morbus, and all forms of food poisoning, which are almost invariably accompanied by diarrhea.

Overeating, improper eating, or unwise use of purgatives may result in diarrhea, while the fermentative and putrefactive types are the result of bacterial action.

Type of diet Nonroughage. The foods selected should conform to the four following rules:

1. Nonstimulating and nonirritating.
2. Easily digested, leaving little residue.
3. Not likely to ferment.
4. As astringent as possible.

Dietetic treatment The treatment will depend somewhat upon the type of the disorder. If the cause can be ascertained, a restriction or regulation of food to suit the individual need would naturally be indicated.

Diet in first stages Acute cases from whatever cause call for a day or two of complete rest for the intestinal tract. During this period the patient is allowed plenty of fresh but not cold water. Nonnutritive beverages such as clear broth and weak tea without milk or sugar may be served every 2 or 3 hours.

Gradual increase of diet As acute symptoms disappear, the diet may be increased gradually, keeping in mind that it is safer to give too little rather than too much food. A complete return to a normal diet is not safe until all symptoms of intestinal disturbance have disappeared.

DIET FOR FERMENTATIVE DIARRHEA [2]

Principles First Stage, intestinal rest. Second Stage, minimum carbohydrate diet. Third Stage, restoration of carbohydrates.

Indications Fermentative diarrhea.

Contraindications Mixed-type diarrhea.

[2] Harry Gauss, M.D., "Special Diets in Disease," in *Modern Hospital,* 28 (1927), 132. Revised 1939.

FIRST STAGE

(First 2 Days—time is variable)

8 A.M.	Weak tea, no sugar or milk
10 A.M.	Clear broth
NOON	Weak tea
3 P.M.	Clear broth
6 P.M.	Weak tea
9 P.M.	Clear broth

SECOND STAGE

(Third to Sixth Day)

	PROTEIN (*grams*)	FAT (*grams*)	CARB. (*grams*)	CALORIES
8 A.M.:				
Protein milk, 220 c.c.	6.6	5.5	3.3	92
Soft-boiled eggs, 2	13.2	12.0	0.0	166
Weak coffee, plain	0.0	0.0	0.0	00
10 A.M.:				
Clear broth	0.0	0.0	0.0	00
Cottage cheese, 50 grams	10.5	0.5	2.1	56
Noon:				
Clear broth	0.0	0.0	0.0	00
Roast beef, 50 grams	11.1	14.3	0.0	178
Gelatin, no sugar	1.4	0.0	0.0	6
3 P.M.:				
Clear broth	0.0	0.0	0.0	00
6 P.M.:				
Clear broth	0.0	0.0	0.0	00
Scrambled eggs, 2	13.2	12.0	0.0	166
Butter, 15 grams	0.1	12.7	0.0	118
Chicken, finely chopped, 50 grams	10.7	1.2	0.0	55
Cottage cheese, 50 grams	10.5	0.5	2.1	56
9 P.M.:				
Protein milk, 220 c.c.	6.6	5.5	3.3	92
	83.9	64.2	10.8	985

THIRD STAGE

(Seventh to Tenth Day, or Longer)

	PROTEIN (*grams*)	FAT (*grams*)	CARB. (*grams*)	CALORIES
8 A.M.:				
Orange, 1, 50 grams	0.4	0.1	5.8	26
Soft-boiled eggs, 2	13.2	12.0	0.0	166
White bread, toasted, 1 slice	2.7	0.4	15.9	80
Butter, 7½ grams	0.0	6.3	0.0	59
Weak coffee	0.0	0.0	0.0	00
10 A.M.:				
Protein milk, 220 c.c. *or* fermented milk, as acidophilus	6.6	5.5	3.3	92
Noon:				
Clear broth	0.0	0.0	0.0	00
Roast beef, 50 grams	11.1	14.3	0.0	178
Cottage cheese, 50 grams	10.5	0.5	2.1	56
Puréed carrots, 100 grams	0.5	0.2	3.4	18
Butter, 7½ grams	0.0	6.3	0.0	59
White bread, 1 slice, 28 grams	2.7	0.4	15.9	80
Cornstarch pudding *or* tapioca	1.0	1.2	79.0	340
3 P.M.:				
Clear broth	0.0	0.0	0.0	00
6 P.M.:				
Clear broth	0.0	0.0	0.0	00
Soft-boiled eggs, 2	13.2	12.0	0.0	166
Puréed spinach, 100 grams	2.1	4.1	2.6	57
White bread, toasted, 1 slice	2.7	0.4	15.9	80
Butter, 7½ grams	0.0	6.3	0.0	59
Gelatin, no sugar	1.4	0.0	0.0	6
9 P.M.:				
Protein milk, 220 c.c. *or* acidophilus milk	6.6	5.5	3.3	92
	74.7	75.5	147.2	1614

DIET FOR PUTREFACTIVE DIARRHEA[3]

Principles First Stage, intestinal rest. Second Stage, minimum protein diet. Third Stage, restoration of protein.

Indications Putrefactive diarrhea, diarrhea of achylia gastrica, mucous colitis.

Contraindications Diabetes, fermentative diarrhea.

FIRST STAGE

(One to Three Days—time is variable)

8 A.M. Weak tea, no sugar or milk, 220 c.c.
Noon Weak tea, 220 c.c.
3 P.M. Clear broth, 220 c.c.
6 P.M. Weak tea, 220 c.c.
9 P.M. Clear broth, 220 c.c.

SECOND STAGE

(Third to Fifth Days)

	PROTEIN (*grams*)	FAT (*grams*)	CARB. (*grams*)	CALORIES
8 A.M.:				
Weak tea, no sugar or milk				
Arrowroot gruel				
Arrowroot, 50 grams	0.0	0.0	45.1	185
Sugar, 2 grams	0.0	0.0	2.0	8
Milk, 100 c.c.	3.3	4.0	5.0	71
Salt, 1 gram	0.0	0.0	0.0	00
10 A.M.:				
Boiled rice, 100 grams	2.8	0.1	24.4	112
Sugar, 2 grams	0.0	0.0	2.0	8
Milk, 60 c.c.	2.0	2.4	3.0	43
Clear broth, 220 c.c.	0.0	0.0	0.0	00
Noon:				
Cornstarch (or tapioca) pudding				
Cornstarch, or tapioca, 50 grams	0.0	0.0	47.5	195
Sugar, 30 grams	0.0	0.0	30.0	123
Milk, 30 c.c.	1.0	1.2	1.5	22
Weak tea				
3 P.M.:				
Weak tea, 220 c.c.				
Arrowroot (or tapioca) gruel	3.3	4.0	52.1	264

[3] Gauss, *op. cit.*

SECOND STAGE—Continued

	PROTEIN (*grams*)	FAT (*grams*)	CARB. (*grams*)	CALORIES
6 P.M.:				
Clear broth, 220 c.c.	0.0	0.0	0.0	00
Boiled rice, milk, and sugar	4.8	2.5	29.4	163
9 P.M.:				
Clear broth, 220 c.c.	0.0	0.0	0.0	00
Cornstarch (or tapioca) pudding	1.0	1.2	79.0	340
	18.2	15.4	366.1	1719

(Sixth to Ninth Days)

	PROTEIN (*grams*)	FAT (*grams*)	CARB. (*grams*)	CALORIES
8 A.M.:				
Arrowroot (or tapioca) gruel	3.3	4.0	52.1	264
Weak tea	0.0	0.0	0.0	00
Puréed carrots, 100 grams	0.5	0.2	3.4	18
Butter, 7½ grams	0.0	6.3	0.0	59
10 A.M.:				
Boiled rice, cream, and sugar	4.8	2.5	29.4	163
Clear broth	0.0	0.0	0.0	00
Noon:				
Cornstarch (or tapioca) pudding	1.0	1.2	79.0	340
Baked squash, 100 grams	1.4	0.5	9.0	47
Weak tea	0.0	0.0	0.0	00
3 P.M.:				
Arrowroot (or tapioca) gruel	3.3	4.0	52.1	264
Clear broth	0.0	0.0	0.0	00
6 P.M.:				
Boiled rice, cream, and sugar	4.8	2.5	29.4	163
Mashed potatoes, creamed, 100 grams	2.6	3.0	17.8	112
Weak tea	0.0	0.0	0.0	00
9 P.M.:				
Cornstarch (or tapioca) pudding	1.0	1.2	79.0	340
Clear broth	0.0	0.0	0.0	00
	22.7	25.4	351.2	1770

NOTE: The order may be varied to relieve the monotony, and flavoring agents may be added, such as chocolate, vanilla, etc.

THIRD STAGE

(Tenth to Fourteenth Days)

8 A.M.:	PROTEIN (*grams*)	FAT (*grams*)	CARB. (*grams*)	CALORIES
Orange, 1, 50 grams	0.4	0.1	5.8	26
Arrowroot (or tapioca) gruel	3.3	4.0	52.1	264
White bread, 2 slices, 53 grams	5.5	0.8	31.8	160
Butter, 15 grams	0.1	12.7	0.0	118
Weak tea	0.0	0.0	0.0	00
10 A.M.:				
Clear broth	0.0	0.0	0.0	00
Noon:				
Clear broth	0.0	0.0	0.0	00
Boiled breast of chicken, 50 grams	10.7	1.2	0.0	55
Mashed potatoes, creamed, 100 grams	2.6	3.0	17.8	112
Puréed carrots, 100 grams	0.5	0.2	3.4	18
Cornstarch (or tapioca) pudding	1.0	1.2	79.0	340
White bread, 2 slices, 53 grams	5.5	0.8	31.8	160
Butter, 15 grams	0.1	12.7	0.0	118
3 P.M.:				
Weak tea	0.0	0.0	0.0	00
6 P.M.:				
Clear broth	0.0	0.0	0.0	00
Soft-boiled egg, 1	6.6	6.0	0.0	83
Cottage cheese, 50 grams	10.5	0.5	2.1	56
Baked squash, 100 grams	1.4	0.5	9.0	47
Boiled rice, milk, and sugar	4.8	2.5	29.4	163
White bread, 2 slices, 53 grams	5.5	0.8	31.8	160
Butter, 15 grams	0.1	12.7	0.0	118
9 P.M.:				
Cornstarch (or tapioca) pudding	1.0	1.2	79.0	340
	59.6	60.9	373.0	2338

NOTE: After the diarrhea is under control, it is sometimes followed by constipation; the high-residue diet may then be given.

CHRONIC DIARRHEA

If diarrhea becomes chronic, a diet chosen from the following foods should be used as long as the condition persists.

Foods allowed

Shellfish Soft part of raw oysters.

Soups Cream soups.

Fish Any soft, white-fleshed, non-oily variety.

Meat Beef, lamb without gristle, chicken.

Cereals Farina, cream of wheat, grapenuts, cornflakes, well-boiled rice.

Gruels Vermicelli and other cereal gruels.

Bread Stale bread, toast, zwieback, toasted crackers, except those made of whole grains.

Cheese Ripe American, Canadian, cream or cottage, pineapple.

Desserts Gelatin desserts made with little sugar, farina pudding, tapioca, blanc mange, or almost any cereal pudding; simple cake at times, such as sponge cake.

Drinks Water, tea, black coffee, cocoa, claret, dry sherry, Burgundy, whisky and water, or brandy and water.

Foods to avoid

Fish Tough or oily fish, clams, etc.

Meat Pork, veal, ham, duck, goose.

Vegetables Green vegetables, salads.

Bread Hot breads.

Fruits All kinds, also fruit juices.

Desserts Pies and sweets of all kinds.

Miscellaneous Condiments, pickles, olives.

Liquids Sweet wines. Milk is usually avoided. If prescribed, it should be boiled or skimmed.

Foods allowed in certain cases

Malted milk may often be used on cereals rather than fresh milk.

Kumyss, zoolak, fresh milk, boiled.

Turkey, bacon, crisp.

Potatoes, white, baked.

Eggs Boiled, baked, poached, omelet, scrambled.

Vegetables Baked Hubbard squash, well-stewed celery, creamed spinach, small boiled onions. Boiled peas or lima beans put through a strainer.

SUGGESTED DIETS FOR CHRONIC DIARRHEA

(Nonroughage)

FIRST DAY

For 1800 Calories a Day: Approximate value—protein, 60 grams; fat, 75 grams; carbohydrate, 222 grams.

Breakfast:		MEASURE	OUNCES	CALORIES
7:30 A.M.	Cream of wheat	¾ cup	6.0	100
	Butter	1 tbsp.	0.5	100
	Toast	2 slices	2.6	100
9:30 A.M.	Cocoa made with water 2 tsp. sugar	1 cup	8.0	55
	Toast	1 slice	1.3	50
	Butter	½ tbsp.	0.3	50
Luncheon:				
12:30 P.M.	Broth with macaroni	1 cup	10.0	75
	Toasted crackers	3	0.9	100
	Scraped beef	3 tbsp.	1.7	75
	Stale white bread	2 slices	2.6	100
	Butter	1 tbsp.	0.5	100
	Lemon jelly	⅓ cup	3.0	100
	Custard sauce	¼ cup	2.2	100
3.30 P.M.	Buttermilk	⅞ cup	7.0	70
Dinner:				
6:30 P.M.	Baked halibut	1 piece 3″x2¼″x¾″	2.3	75
	Carrots, mashed	¾ cup	5.5	50
	French roll, stale	1	1.3	100
	Butter	½ tbsp.	0.3	50
	Rice pudding	⅝ cup	3.5	115
	Vanilla sauce			
	Cornstarch	¼ cup	2.0	100
9:30 P.M.	Tea, very weak	1 cup	8.0	...
	Sugar	2 tsp.	0.3	35
	Toast	2 slices	2.6	50
	Butter	½ tbsp.	0.3	50
				1800

SECOND DAY

For 2000 Calories a Day: Approximate value—protein, 67 grams; fat, 75 grams; carbohydrate, 65 grams

		MEASURE	OUNCES	CALORIES
Breakfast:				
7:30 A.M.	Hominy grits	4/5 cup	6.8	100
	Butter	1 tbsp.	0.5	100
	Toast	2 slices	2.6	100
	Lamb chop, tender eye	1 chop 1″x2″x1/2″	1.6	100
9:30 A.M.	Tea	1 cup	8.0	...
	Sugar	2 tsp.	0.3	35
	Zwieback	3 pieces	0.8	100
	Butter	1/2 tbsp.	0.3	50
Luncheon:				
12:30 P.M.	Lentil soup	1 cup	9.0	100
	Toasted crackers	2	0.5	50
	Chicken, minced *and*	1/4 cup	0.9	100
	Rice	5/8 cup	3.4	85
	French roll, stale	1	1.3	100
	Butter	1/2 tbsp.	0.3	50
	Snow pudding	2/3 cup	2.2	100
3:30 P.M.	Kumyss	3/4 cup	6.8	100
Dinner:				
6:30 P.M.	Poached egg	1 egg	2.0	75
	Purée of lima bean	1/2 cup	2.6	100
	White bread, stale	1 slice	1.3	50
	Butter	1/2 tbsp.	0.3.	50
	Tapioca-cornmeal pudding	3 tbsp.	2.7	150
	Lemon sauce	1/4 cup	2.0	100
9:30 P.M.	Hot malted milk, made with water	1 cup	8.0	65
	Toast	2 slices	2.6	100
	Butter	1/2 tbsp.	0.3	50
				2016

THIRD DAY NO. I

For 1650 Calories a Day: Approximate value—protein, 63 grams; fat, 69 grams; carbohydrate, 195 grams

		MEASURE	OUNCES	CALORIES
Breakfast:				
7:30 A.M.	Farina	3/4 cup	6.0	100
	Butter	1 tbsp.	0.5	100
	Toast	2 slices	2.6	100
	Poached egg	1 egg	2.0	75
10:30 A.M.	Cocoa, with water	1 cup	8.0	55
	Toast	1 slice	1.3	50
	Butter	1/2 tbsp.	0.3	50
Luncheon:				
12:30 P.M.	Broth with rice	1 cup	8.0	75
	Toasted crackers	2	0.5	50
	Baked cod	1 piece 3″x2½″x1″	4.8	100
	Baked Hubbard squash	1/2 cup	4.0	55
	White bread, stale	2 slices	2.6	100
	Butter	1/2 tbsp.	0.3	50
	Coffee jelly	2/3 cup	4.5	50
	Custard sauce	1/6 cup	1.1	50
3:30 P.M.	Tea	1 cup	8.0	...
	Sugar	2 tsp.	0.3	35
	Zwieback	1½ pieces	1.3	50
	Butter	1/2 tbsp.	0.3	50
Dinner:				
6:30 P.M.	Minced chicken	1/4 cup	0.9	100
	Chopped spinach	1/2 cup	4.3	20
	Toast	2 slices	2.6	100
	Butter	1 tbsp.	0.5	100
	Tapioca pudding	2/5 cup	2.8	100
9:30 P.M.	Hot peppermint tea	1 cup	8.0	...
	Sugar	2 tsp.	0.3	35
				1650

THIRD DAY NO. II

For 2200 Calories a Day: Approximate value—protein, 75 grams; fat 100 grams; carbohydrate, 250 grams

		MEASURE	OUNCES	CALORIES
Breakfast:				
7:30 A.M.	Farina	⅔ cup	6.0	100
	Butter	1 tbsp.	0.5	100
	Toast	2 slices	2.6	100
	Poached egg	1 egg	2.0	75
10:30 A.M.	Cocoa, with water	1 cup	8.0	55
	Toast	2 slices	2.6	100
	Butter	1 tbsp.	5.5	100
Luncheon:				
12:30 P.M.	Broth with rice	1 cup	6.0	75
	Toasted crackers	3	0.9	100
	Cod, baked	1 piece 3"x2½"x1"	4.8	100
	Baked Hubbard squash	½ cup	4.0	55
	White bread, stale	2 slices	2.6	100
	Butter	1 tbsp.	0.5	100
	Coffee jelly	¾ cup	4.5	50
	Custard sauce	¼ cup	2.2	100
3:30 P.M.	Tea	1 cup	8.0	...
	Sugar	2 tsp.	0.0	35
	Zwieback	3 pieces	2.6	100
	Butter	½ tbsp.	0.3	50
Dinner:				
6:30 P.M.	Minced chicken	⅜ cup	1.4	150
	Chopped spinach	½ cup	4.3	20
	Toast	2 slices	2.6	100
	Butter	1 tbsp.	0.5	100
	Tapioca pudding	⅖ cup	2.8	100
9:30 P.M.	Hot peppermint tea	1 cup	8.0	....
	Sugar	2 tsp.	0.3	35
	Toast	2 slices	2.6	100
	Butter	1 tbsp	0.5	100
				2200

ACUTE COLITIS

Acute colitis is an inflammatory condition of the large bowel characterized by diarrhea, abdominal pain or cramps, sometimes by the passage of mucus in the stools, and other signs of colon irritability.

Dietetic treatment[4] The colon should be cleaned out with warm oil enemas, after which food should be withheld for at least 24 hours. The first diet should be a bland lacto-farinaceous (see page 335) diet with acidophilus milk, which causes a change of flora in the colon and is considered a specific for this trouble.

As the condition improves, puréed vegetables, cream soups, white bread, and scraped beef may be added, gradually returning to a normal diet which is rich in vegetables and low in the putrefactive proteins, such as egg and chicken. Avoid undereating.

Agar-agar taken in broth or eaten dry will act as a culture medium for the proper colon flora. It should be taken for about a month after one begins to eat a variety of foods. Petrolatum is of service.

When the colon is healed of mucus and the tenderness is gone, bulky foods and dark breads should constitute most of the diet. If tenderness returns, change to the bland or smooth diet for a day or two. It is better to endure some tenderness than to stay on the bland diet too long, as this prevents ever returning to normal. Avoid excess sugar and rich desserts.

LOW-RESIDUE DIET FOR COLITIS[4]

Foods allowed

Soups All cream soups with vegetables puréed.

Fruits Orange juice, grapefruit juice, strained fruits, such as prunes, apples, peaches, pears, etc.

Vegetables Purée of vegetables, such as spinach, peas, carrots, tender string beans, asparagus tips, squash, artichoke hearts. Two small servings daily.

Milk Use as a beverage or may be used in cooking cereals in place of water. Also buttermilk or sour milk.

Eggs One or 2 daily, soft-cooked or poached.

Cheese Cottage cheese only.

Meats Beef, lamb, chicken, fish, baked, boiled, or broiled.

[4] Courtesy of the Dept. of Public Health, the San Francisco Hospital, San Francisco, California.

Cereals Rice, cream of wheat, corn meal, *strained* oatmeal, macaron spaghetti, noodles. *Use no cereals with bran.*

Fat Butter, cream.

Bread White toast.

Sweets Sugar, jellies, honey, in moderate amounts.

Desserts Rice, tapioca, cornstarch puddings, custard, and gelati dishes.

Beverages Buttermilk, lemonade, orangeade, *very weak* tea or coffee

Foods to avoid

1. Raw fruits.
2. Coarse, whole-grain cereals.
3. Strong-flavored vegetables such as cabbage, Brussels sprouts, onions, cauliflower.
4. Dried fruits—raisins, figs, etc.
5. Nuts and cheese, except cottage cheese.
6. Fatty foods, except butter and cream.
7. Rich desserts and pastries.
8. Concentrated sweets.
9. Hot breads.
10. Fried foods.
11. High seasonings, pepper, spices, pickles.
12. Fibrous or fatty meats, especially smoked meats, canned or fried fish, pork, veal, crab, lobster.
13. Large amounts of fluid, very hot or very cold foods, alcoholic beverages.

SAMPLE MENU

Breakfast:
- Orange juice
- Cream of wheat with cream
- Buttered white toast
- Weak coffee
- Poached egg

Dinner:
- Cream of pea soup
- Broiled whitefish
- Mashed potatoes
- Puréed squash
- Chocolate cornstarch pudding
- Butter
- White toast

Supper:
- Rice, cooked in milk
- Puréed spinach
- Poached egg
- White toast
- Butter
- Puréed fruit
- Buttermilk

SIPPY DIET FOR COLITIS[5]

The following outline gives a general idea of the management of colitis, but needs a special adjustment for individual cases.

I

Gruels Five times a day made of cream of wheat, farina, barley, or oatmeal made thin with water. These should be hot and may be served with toasted crackers and butter.

II

Milk Boiled milk is then substituted for one-half the gruel.

Eggs One or 2 a day are then added in any soft form, such as coddled, poached, scrambled, omelet, soft-boiled. Never raw, hard-boiled, or fried.

Custards Once or twice a day.

Bread Toast or white bread with butter.

Meat Bacon and white meat of chicken. Red meats well cooked may be taken at this time, but on special order only.

Cheese Cottage.

Cereals Well-cooked farina, cream of wheat, rice, oatmeal, with cream and sugar if desired.

III

Potatoes Either mashed or baked, at first once a day, later twice a day.

Vegetables Puréed and well cooked, such as spinach, string beans, cabbage, carrots, parsnips, etc. At first once a day, then twice.

IV

Stewed fruits and coarse breads.

V

Raw fruits and vegetables.

Patients may at any time unless otherwise ordered have coffee substitutes or chocolate with feedings.

Additions are made somewhat in the order given and at daily inter-

[5] Strict Colitis Diet as outlined by Dr. W. H. Sippy. California State Dietetic Association, *Compilation of Diets,* Institute Press, Los Angeles, Calif., 1942.

vals. As soon as bulk is sufficient, the 5 feedings a day are replaced by 3 meals a day of type of food ordered.

Patients are kept on gruels and boiled milk until distress has abated and bowel movements are normal—that is, of the size, shape, and consistency of a ripe banana. It is when they tend to become constipated—that is, hard and dry, that the food is increased.

APPENDICITIS

Dietetic treatment Complete abstinence from food during the first few days of acute illness is recommended. If any food is given, it should be liquid and in very small portions. Strained barley, oatmeal, or rice water may be used, also thickened soup and very weak tea. In very severe cases or where there is perforation, even water is not allowed. Some give an occasional teaspoonful of cool water if thirst is extreme. Nourishment may be given in an enema.

An egg beaten up in milk or bouillon may be given after first severe symptoms have passed and nothing else allowed until fever and pain have disappeared. Then soft-cooked eggs, small portions of tender, easily digested meats, and later mashed potatoes, bread and butter, and light vegetables may be added. Return to normal diet should be very gradual.

Chronic appendicitis is often accompanied by constipation and can be benefited by using an anticonstipation diet.[6] If constipation is not present the diet should be made up of very easily digested foods, avoiding those which are liable to fermentation, such as onions, cauliflower, cabbage, fresh breads and pies. Thorough mastication of all food is advised.

CONSTIPATION

Definition Constipation is a condition of intestinal stasis in which there is abnormal retention of feces in the colon. Toxic substances may be absorbed into the tissues, and a long line of serious disorders may result from neglect of this trouble.

Types Constipation may be either functional or organic. It is generally considered to be of three types:

[6] See page 220.

1. Functional
   a. Atonic
   b. Spastic

2. Organic—Obstructive

It is highly desirable that the type should be determined by the physician before the dietetic treatment is prescribed, since the diet differs with different types, that for the atonic being not at all suitable for the spastic or the obstructive.

ATONIC CONSTIPATION

Definition Of the functional types, atonic is one of the most common forms. It consists of a lazy or inactive colon in which there is a loss of tone in the intestinal walls. The normal peristaltic waves become feeble, and fecal matter moves too slowly and accumulates.

Cause Atonic constipation may result from one or more of the following causes:

1. Faulty or poorly balanced diet—too few fruits and vegetables, too little roughage, deficiency of vitamins A and B.
2. Insufficient food.
3. Irregular habits of eating, particularly the omission of breakfast.
4. Irregular habits of defecation.
5. Lack of sufficient and proper exercise.
6. Habitual use of cathartics, overstimulating and consequently exhausting the bowel muscles so that they do not respond to normal stimulus.
7. Insufficient water intake.
8. Old age, frequently accompanied by weakened intestinal muscles.

Dietetic treatment Atonic constipation may usually be relieved by diet, provided proper habits are also established. Roughage foods that leave a residue of indigestible material like cellulose in the intestine tend to stimulate normal bowel movement.

A high-fat diet, including approximately 225 grams of fat daily, is sometimes used when a roughage diet is not desirable. Amounts of fat small enough to be digested and absorbed are not effective.

The following are useful in correcting the atonic type of constipation:

1. Water
2. Roughage
3. Bulk
4. Gas-forming foods
5. Organic acids
6. Lubricants
7. Milk cultures and concentrated milk sugars

Water The use of 8 to 10 glasses of water per day aids in flushing out the system. Two or more glasses upon arising in the morning will often start intestinal peristalsis and produce a normal bowel movement. Drinking as much as 2 or 3 pints at one time on an empty stomach is to be discouraged.

Roughage Foods rich in cellulose, which acts as roughage, are valuable. These are such vegetables as asparagus, cabbage, celery, lentils with hulls, lettuce, onions, radishes, spinach, and string beans.

All unpared fruits, such as apples, peaches, or pears, may be used. Prunes, dates, figs, and raisins are very useful, especially if taken at night before retiring.

In severe cases of atonic constipation, as much as 600 to 800 grams daily of fruits and vegetables is frequently necessary.

Unseeded berries are good, except blackberries, which are constipating.

Cereals with their natural bran are helpful, such as rolled oats, cut oats, cut wheat, brown rice, etc.

Bran itself may be used either plain or made into bread, muffins, or wafers.

Bulk Any of the roughage foods may be used for bulk. Agar-agar, an edible seaweed, may be flavored and cooked as a jelly, served on cereal, or cooked into cereal. It may also be used in wafer form or made into biscuits. It is not digested and so forms an excellent means of securing bulk without roughage.

Lubricants All fats and oils are useful for those who do not absorb them readily. Mineral oils are sometimes valuable. Not being absorbed, they act as lubricants, softening the feces and preventing too great absorption of water, thus making evacuation less difficult.

If used in too large quantity they "leak" disagreeably. A stable emulsion of mineral oil with agar-agar is now available, which overcomes this difficulty and at the same time adds bulk in soft form to the intestines.

Organic acids Acid fruits owe a very small part of their laxative quality to the salts or organic acids they contain. Acids tend to stimulate the stomach and intestinal movement.

Fruit and fruit juice or warm water flavored with fruit juice is effective in stimulating peristalsis if taken on an empty stomach. All common fruits and berries, except blackberries, are helpful. In cases of weak stomach, only mild fruit acids should be used.

Gas-forming foods The gas formed by fermentation of food is helpful in breaking up the fecal mass and in stimulating peristalsis.

Such vegetables as onions, turnips, cabbage, cauliflower, Brussels sprouts, and dry legumes are rich sources of hydrogen disulphide (H_2S).

Molasses, honey, and maple products are valuable as sources of gas and organic acids.

Mineral waters and carbonated water are also useful. Some mineral waters contain laxative mineral elements. The physician will usually prescribe a form suited to the patient's needs.

Milk cultures and milk sugars Professor Rettger of Yale recommends from a pint to a quart of acidophilus milk daily with from 25 to 100 grams of lactose for chronic cases. If taken over a sufficient period of time, this will afford almost certain relief for chronic constipation and the autointoxication which so frequently follows it. Bacillus acidophilus is a normal part of the intestinal flora of infants and adults, and its implantation in the intestine antagonizes or displaces the harmful putrefactive bacteria and helps to rid the system of their dangerous products. Large amounts of lactose or lactodextrin are also valuable.

Foods allowed in diets for atonic constipation

Vegetables All kinds, especially those containing large amounts of cellulose, such as lettuce, chard, endive, romaine, cabbage, celery, spinach, onions, turnips, parsnips, squash, peas, beans, asparagus, tomatoes, cauliflower, etc.

Fruits All kinds, including apples, apricots, peaches, plums, pears, grapes, prunes, dates, raisins, figs, and currants. Oranges, grapefruit, and rhubarb are useful for both their cellulose and their organic acids.

Cereals Whole-grain cereals, such as rolled oats, pettijohn, and shredded wheat, graham and whole-wheat bread.

Bran Bran is useful as a means of adding cellulose, although its long-continued use is not recommended. One to 2 tablespoons of bran as needed may be eaten during each meal, moistened with kumyss, milk, tea, coffee, or cocoa.

Agar Agar is a form of seaweed. It is not digested in the human body and therefore serves as roughage. It is sometimes eaten in the form of flakes mixed with cereals and often served as agar jelly or in

biscuits, wafers, and muffins. Agar jelly can be used when bran would be too harsh a stimulant.

Milk All forms, plain or combined in any way which is desired. Also cream, butter, and cheese.

Meat All forms, including fish and poultry, unless intestinal putrefaction is present.

Salad dressing Any kind. Mayonnaise made with mineral oil is recommended.

Eggs Raw or prepared in any way desired.

Beverages Coffee, tea, coffee substitutes, cocoa, fruit juices, and water. Taking a glass or 2 of water upon arising in the morning often helps to stimulate peristalsis and produce a good bowel movement. Drinking as much as two or three pints of water at one time on an empty stomach should be discouraged.

Type of diet A diet consisting of high-residue, high-fat, and natural laxative foods is indicated for the correction of atonic constipation.

SUGGESTED DIETS FOR CONSTIPATION

DIET NO. I

For 2277 Calories a Day: Approximate value—protein 61.9 grams.

		MEASURE	OZ.	PRO. (*grams*)	CALORIES
On rising:	Water	2 glasses	...	...	...
Breakfast:					
7:30 A.M.	Orange	1 large	9.5	1.6	100
	Oatmeal	½ cup	4.0	2.0	50
	Whole-wheat bread, toasted	2 slices ½" thick	2.4	6.4	160
	Egg	1	2.0	6.7	75
	Butter	1 tbsp	0.5	0.1	100
	Sugar	2 tbsp.	1.0	...	104
	Cream, thin	¼ cup	2.0	1.6	108
	Coffee	...	...	...	...
Dinner:					
12:30 P.M.	Tomato soup	⅜ cup	3.5	1.5	50
	Roast beef	2 slices 4¼"x1½"x⅛"	1.8	12.2	180
	Baked potato	1 medium	3.5	2.2	83

SUGGESTED DIETS FOR CONSTIPATION—Continued

		MEASURE	OZ.	PRO. (*grams*)	CALORIES
Dinner (continued):					
	String beans	½ cup	1.9	1.2	22
	Bran bread	1 slice	0.7	1.8	50
	Butter	1 tbsp.	0.5	0.1	100
	Lettuce ad libitum				
	French dressing	1½ tbsp.	0.6	...	100
	Lemon jelly	½ cup	3.8	2.0	100
	Whipped cream	½ tbsp.	0.2	0.1	25
Supper:					
6:30 P.M.	Baked beans	1 cup	8.2	16.1	300
	Graham bread	2 slices	2.0	5.0	148
	Butter	1 tbsp.	0.5	0.1	100
	Baked apple	1 large	4.6	0.5	200
	Whipped cream	1 tbsp.	0.4	0.2	50
Before Retiring:	Prunes	3 medium	1.0	1.5	72
					2277

DIET NO. II [7]

Breakfast:	PROTEIN (*grams*)	FAT (*grams*)	CARB. (*grams*)	CALORIES
Stewed figs (3), 125 grams *or* any fruit, fresh, cooked, preserved, *or* dried. The skins to be eaten	1.5	0.4	51.1	210
Oatmeal, 100 grams *or* any cooked *or* dry cereal. Bran may be added	8.7	8.1	21.8	201
Cream, 1 ounce, 30 c.c.	1.1	7.7	1.0	81
Sugar, 1 tsp., 7 grams	0.0	0.0	7.0	29
Whole-wheat bread, toasted, 2 slices, 84 grams	8.0	0.8	41.8	212
Butter, 15 grams, 1 ball	0.1	12.7	0.0	118
Marmalade, 1 tbsp., 30 grams *or* other jam, jelly *or* preserve	0.2	0.0	25.0	105
Coffee, cream, and sugar	1.1	7.7	8.0	110
Luncheon:				
Vegetable soup, 120 c.c.	3.5	0.0	0.6	17

[7] Gauss, *op. cit.*

SUGGESTED DIETS FOR CONSTIPATION—Continued

Luncheon (continued):	PROTEIN (*grams*)	FAT (*grams*)	CARB. (*grams*)	CALORIES
Roast beef, 50 grams *or* other meat, eggs *or* fish, boiled, broiled, *or* stewed	11.1	14.3	0.0	178
Baked potato with skin	3.7	0.2	32.1	149
Carrots, 100 grams *or* any other 2 cooked *or* prepared vegetables, as onions, Brussels sprouts, cabbage, cole slaw, celery, cauliflower, okra, tomatoes, string beans, asparagus, turnips, olives, radishes, etc.	0.5	0.2	3.4	18
Salad				
Lettuce, 50 grams	0.6	0.2	1.5	10
Tomatoes, 50 grams	0.5	0.2	2.0	12
Mayonnaise, 20 grams	0.2	19.9	0.1	187
Whole-wheat bread, 2 slices	8.0	0.8	41.8	212
Butter, 15 grams	0.1	12.7	0.0	118
Baked apple with skin, 20 grams *or* other fruit, fresh, cooked, *or* preserved	0.6	0.6	29.3	128
Supper:				
Same as lunch except that meat is to be eaten only once a day	28.8	49.1	110.8	1029
	78.3	135.6	377.3	3133

Note: Drink a glass of water immediately upon arising. Have a regular time for meals and a regular time for going to the toilet. Eat slowly and chew your food well. Take a daily walk in the open air. Practice setting up exercises for at least 10 minutes before breakfast but after drinking the water.

Lie on back, raise the right leg to upright position, keeping the knee stiff, then the left leg, then alternate. Lie on back and raise both legs at the same time. Stand up, keeping knees stiff, bend forward and touch the floor. Bend backward from the hips. Bend to right and left from the hips. Rotate the body to right and left. Other exercises may be added.

DIET NO. III

A HIGH-FAT DIET FOR CONSTIPATION

This diet has proven useful in combating constipation, especially with patients too sick or uncomfortable to consume a sufficient quantity of fruits and vegetables—600 to 800 grams—to relieve obstinate cases of chronic constipation.

The diet consists of:

5% vegetables		Lean meat	50 grams
raw	50 grams	Cream (20%)	460 grams
cooked	50 grams	Milk	400 grams
10% fruits		Butter	50 grams
orange juice	50 grams	Mayonnaise (85% fat)	45 grams
raw or cooked fruit	100 grams	Bland cereal	20 grams
Potato, baked	200 grams	Sugar	15 grams
Eggs	2	Coffee	200 c.c.
White bread	60 grams	Water	1000 c.c.
Bacon, broiled	20 grams		

This contains approximately 164 grams carbohydrate, 66 grams protein, and 224 grams fat and supplies 3026 calories.

Usually from 3 to 5 days are required to establish normal bowel habits by this method. The high fuel value makes it especially desirable for undernourished patients. Care must be taken to serve the food attractively and to use the fat in palatable ways. Cream soups, cocoa, malted milk, eggnogs, and ice cream are suggested. Dishes containing a large amount of fat are most attractive when served either very hot or very sold. Warm visible fat often disgusts the patient.

SPASTIC CONSTIPATION

Spastic constipation is caused by the spastic colon, and the "spastic colon," states Gauss,[8] "is a functional disturbance of the colon characterized by hypertonicity or spasticity of the colon, clinically by a variety of symptoms including abdominal consciousness, abdominal pain, constipation, flatulence, and a tendency toward introspection."

Cause Spastic constipation is frequently the result of one of the following conditions:

[8] Harry Gauss, M.D., "The Spastic Colon," *Annals of Internal Medicine*, 3 (1930), 1128. Revised, 1939.

1. Previous illness.

2. Congestion of abdominal organs, frequently caused by such diseases as rickets, diabetes, fever, etc.

3. Diseases of the mucous membrane of the intestine.

4. Nervous disturbances.

5. Unwise use of cathartics, resulting in overstimulated nerve endings and consequent spasm.

Dietetic treatment In spastic constipation the patient is given a nonresidue diet until the colon is rested and the pain relieved. Fluids and soft-solids[9] are used during this period. The patient is sometimes kept in bed with heat applied to the abdomen until the spasticity is diminished. Small quantities of the less bulky foods, cooked and finely divided, are then given, and by gradual steps a normal diet is achieved.

Mild organic acids are useful. High-fat diets are often helpful, and mineral oil may be effective. Eight to 10 glasses daily of not too cold water, plain or flavored with fruit juice, are valuable in this condition. Milk cultures or milk with lactose or lactodextrin is also helpful.

Avoid tea, coffee, alcoholic beverages, and tobacco. Omit the use of cathartics.

Foods allowed in a nonresidue diet

Milk Sweet, sour, buttermilk, Bulgarlac, acidophilus. Also cream, cheese, and butter.

Eggs Raw or cooked in any style.

Cereals Only finely milled products, as cream of wheat, farina, polished rice, cornflakes, or *strained* whole-grain cereals, as rolled oats.

Bread Only white bread, plain or toasted, rolls or biscuits made of white flour.

Vegetables White potatoes, baked, boiled, mashed, or creamed. All other vegetables should be strained and served in cream soups or as vegetable purées.

Beverages Cocoa, coffee substitutes.

Desserts Custards, gelatin jellies, rennet-custard, bread and rice puddings, ice cream, tapioca.

Type of diet Spastic constipation calls for a smooth or bland diet, nonirritating and of low residue.

[9] See pages 135-141.

MENU NO. I

For Dr. W. C. Alvarez's Smooth Diets, see pages 171-172.
For Dr. J. Burns Amberson, Jr.'s, Bland Diet, see pages 163-164.

MENU NO. II

Approximate Composition and Caloric Value—carbohydrate, 153 grams; protein, 45 grams; fat, 77 grams; calories, 1485.

Breakfast:

- Cream of wheat with cream and very little sugar
- Coddled egg
- White-bread toast with butter
- Coffee with cream and very little sugar or *café au lait,* cocoa, coffee substitutes, or milk

Luncheon:

- Cream of asparagus soup
- Plain crackers or croûtons
- Baked potato with butter
- Puréed carrots
- Rolls with butter
- Spanish cream

Dinner:

- Cheese soufflé
- Baked creamed potatoes
- Puréed peas
- White bread with butter
- Maple rennet-custard
- Tea

MENU NO. III[10]

Breakfast:

- Strained orange juice
- Cream of wheat
- Dry toast
- cocoa or milk

Luncheon:

- Consommé or vegetable broth
- Soft-boiled egg
- Dry toast
- Plain Jell-O
- Milk

[10] Courtesy of the California State Dietetic Association, *Compilation of Diets.*

Dinner:

Cream of potato soup
Cottage cheese with cream
Dry toast
Baked custard
Milk

If milk is not easily digested, it may be peptonized or boiled. Puréed vegetables and soft-cooked fruits may be added when condition is relieved.

OBSTRUCTIVE CONSTIPATION

Cause Obstructive constipation is due to adhesions or malignant growths which result in more or less complete closure of the tract, so that it is only with difficulty that intestinal residues can pass.

Dietetic treatment Cases of obstructive constipation are difficult to feed, and diet is not a cure. It is nevertheless necessary to nourish the patient and at the same time to avoid aggravating the trouble.

Type of diet The diet given must be of concentrated food value and strictly nonroughage.[11] It is impossible to avoid some accumulation of waste at the point of obstruction, since part of the fecal matter consists of residues of digestive secretions and cell detritus. A fluid diet based on that used by Coleman for typhoid fever [12] is sometimes given.

The diet The diet will include both liquids and soft-solids. Milk may need boiling or peptonizing in order to insure fine curds unless combined with cereals, flour, eggs, or other foods. Buttermilk, Bulgarlac, or acidophilus milk may be better in some cases. The use of meat where solids can be fed must be decided by the physician. In any case, only tender lean meat, carefully freed of all connective tissue, should be given.

All gas-forming foods must be rigidly excluded. These include cabbage, cauliflower, navy, lima, and kidney beans; turnips, onions and spinach; also sugars and syrups. Acid fruits must be used very cautiously if at all.

[11] See pages 163-164, 171-172.
[12] See pages 149-153.

SUGGESTED MENU FOR OBSTRUCTIVE CONSTIPATION DIET

7 A.M.	4 to 6 oz. orange juice, with 2 tbsp. lactose.
9 A.M.	6 to 8 oz. boiled milk flavored with coffee, with 1 tbsp. lactose.
11 A.M.	6 to 8 oz. barley gruel with 1 tbsp. whipped or plain cream.
1 P.M.	6 oz. cream of pea soup.
3 P.M.	6 to 8 oz. eggnog.
5 P.M.	6 oz. malted milk.
7 P.M.	6 oz. milk *or* milk and cream.
9 P.M.	6 oz. oatmeal gruel with 1 tbsp. cream.

FOOD POISONING

Cause Food poisoning may be caused either by naturally poisonous food, such as some varieties of mushrooms, or by food infected by bacteria or containing poisonous products resulting from bacterial action.

Dietetic treatment The dietetic treatment in cases of poisoning would be the same as for any acute affection of the gastro-intestinal canal. All of the offending substances should, of course, be removed. This may necessitate stomach lavage, powerful cathartics, or high colonic irrigations.

Type of diet Low-calorie fluid diet. A simple fluid diet should be given, gradually increasing to soft and later to normal diet as the patient improves. The concomitant condition—acute gastritis, gastro-enteritis, or entro-colitis—should determine the actual diet to be used.

QUESTIONS FOR STUDY

ENTERITIS

1. What causes acute enteritis?
2. What type of diet should be used? Why?
3. How does the dietetic treatment of chronic enteritis differ from that in acute cases?
4. What causes the disorder?
5. What determines the type of diet to be used?

DIARRHEA

1. What are some causes of diarrhea?
2. How is it possible to control diarrhea by diet?

3. What is the usual treatment in acute cases?
4. What rules govern the selection of foods for the later treatment of acut cases and for all chronic cases?
5. Give a list of foods and beverages that may be used.

COLITIS

1. Describe the proper diet for the early stage of treatment in acute colitis the later treatment.

APPENDICITIS

1. What type of diet is used in acute appendicitis? What precautions mus be taken?

CONSTIPATION

1. Name and describe the three types of constipation.
2. What causes atonic constipation? Spastic constipation?
3. What principle underlies the dietetic treatment of each type?
4. Construct a menu suitable for each type.
5. What types of food are useful in atonic constipation?
6. Why are mineral oils given?
7. Describe the high-fat diet for constipation.

FOOD POISONING

1. What are some causes of food poisoning?
2. Discuss the treatment in such cases.

10.
DISEASES OF THE LIVER

Functions The liver is the most important of the organs concerned in the elaboration of food. It serves as a storehouse for many of the nutrients, dispensing them as needed. Several nutrients undergo changes in the liver into forms which can be utilized by the tissues.

In *protein metabolism* the liver serves as a storage reservoir of amino acids absorbed from the intestine. These are then made available as needed to maintain plasma proteins, to replace tissue protein, or as a source of energy.

In *carbohydrate metabolism* the liver plays a most important role. Glucose from the circulating blood is converted into glycogen and stored in the liver until it is needed, when it is reconverted into glucose.

Fat is stored in the liver; and it is there that some of the most pronounced irregularities in fat metabolism may occur.

Bile pigments are formed in the liver tissue, as are the *bile salts,* which function in the absorption of fats, and possibly other substances too—the vitamins, for instance. The flow of bile is greatly affected by diet. Sugar causes a decrease in the secretions of bile and bile salts. Eating of meat increases the secretions of bile and bile salts but decreases the output of bile pigments. In the gallbladder the bile is concentrated by removal of water and stored until needed.

Vitamin metabolism is another process in which the liver plays a part. Carotene, the precursor of vitamin A, is converted into vitamin A in the liver. Several of the vitamins are intimately concerned in the activities of the liver, notably with fat metabolism.

DIETARY REGULATION IN DISORDERS OF THE LIVER

According to Dr. McLester,[1] the pathologic features of the several chronic destructive and degenerative processes involving the paren-

[1] Consult James S. McLester, *Nutrition and Diet in Health and Disease,* 4th ed., Philadelphia: W. B. Saunders Co., 1944.

chyma of the liver are essentially the same, regardless of the type o injury. Protection of the liver, by dietary or other means, involves th same general principles. Dietary regulation should have two objectives (1) to protect the liver against undue demands upon it and (2) t enable the damaged liver to function as efficiently as possible.

Protein Liberal amounts of protein should be supplied in order t enable the liver to maintain adequate reserves and increase its resistanc to further injury.

Carbohydrates An abundance of carbohydrates in easily utilize form should be given.

Fat The intake of fat should be restricted to that needed for additional calories. It should preferably be given in the form of cream, butter, or egg yolk.

Other requirements The diet should be liberal in its content of vitamins and minerals. Alcohol in any form is prohibited, and the use of condiments and highly seasoned foods should be restricted.

MENUS FOR PATIENTS WITH HEPATIC DISEASE [2]

NOTE: The "milk with brewers' yeast" specified in the following menus is made by stirring 2 tablespoonfuls of brewers' yeast into a glass of very cold milk, properly sweetened, and then adding nutmeg. This provides 25 grams of additional protein daily, as well as vitamins. If the yeast makes the patient uncomfortable, milk alone may be prescribed and the vitamins of the B complex given in other form, preferably as a solution of crude liver extract.

SPECIMEN DIET I

Approximate Values—carbohydrate, 300 grams; protein, 105 grams; 2200 calories

7:00 A.M. (or before):

1 glass hot water with juice of ½ lemon

Breakfast:

4 large stewed prunes
Average helping cream of wheat; 1 oz. 20% cream and 2 tsp. sugar
1 poached egg on toast
1 cup cocoa (1 cup milk, 1 tsp. sugar, 1 tsp. cocoa)

[2] *Ibid.*

10:30 A.M.:

1 glass milk with brewers' yeast

Dinner:

Average serving baked macaroni (made with egg and milk only), butter, salt
Grated beets with 1 tsp. honey, butter, and lemon juice
3 heaping tbsp. tapioca cream
1 slice toast, 1 tbsp. jelly or jam
1 glass milk

4:00 P.M.:

1 glass milk with brewers' yeast

Supper:

2 tbsp. Southern spoon bread
1 shirred egg
Peach whip (2 halves peaches, 2 tbsp. whipping cream)
1 glass milk

Bedtime:

1 glass fruit juice

SPECIMEN DIET II

Approximate Values—carbohydrate, 450 grams; protein, 100 grams; 2900 calories

7:00 A.M. (or before):

1 glass hot water with ½ glass orange juice

Breakfast:

1 baked apple with sugar
Farina with 2 oz. cream, 2 tsp. sugar
1 coddled egg
1 slice toast with butter, 1 tbsp. orange marmalade
Milk and coffee

10:30 A.M.:

1 glass milk with brewers' yeast

Dinner:

6 creamed oysters on ½ slice toast
Average serving stewed tomatoes
Medium-sized baked potato with butter
Average serving chocolate or plain blanc mange with 1 tbsp. whipping cream
1 slice toast with 1 tsp. butter, 1 tbsp. jam
1 glass milk

4:00 P.M.:
1 glass milk with brewers' yeast

Supper:
1 slice creamed toast, grated yolk of egg
Average serving hominy grits
Average serving Snow Pudding with fruit sauce
1 piece zwieback with butter
1 glass milk

Bedtime:
4 large stewed figs

CATARRHAL JAUNDICE

Catarrhal jaundice is sometimes a blood-borne infection; but generally it means that the bile passages are obstructed by inflammation. Often it follows or accompanies acute gastro-duodenitis when the infection passes from the duodenum through the duct to the liver. The diet follows the general rule for diet in disorders of the liver. It should be simple and nonstimulating; but care should be taken that the patient gets enough food to meet his nutritive requirements.

Foods allowed

1. Milk should be the chief food 2. Cereals with cream 3. Milk toast 4. Rice with butter 5. Mashed potatoes 6. Eggs and tender meat *after about 10 days* 7. Fruit juices and cooked fruits *later* in the disease

Foods to avoid

1. Fats 2. Broths and meat soups 3. Raw fruits and green vegetables 4. All highly seasoned foods 5. Pepper, sauces, fried foods and complex dishes such as croquettes

MENUS FOR PATIENTS WITH CATARRHAL JAUNDICE [3]

SPECIMEN DIET I

7:00 A.M.:
Hot water with lemon juice

Breakfast:
2 heaping tbsp. Ralston cooked cereal with
1/4 glass whole milk and 2 tsp. sugar
1 piece zwieback; 1/2 tsp. butter; 2 tsp. jelly or jam
1 cup cocoa or milk

[3] McLester, *op. cit.*

10:00 A.M.:

1 glass milk

Dinner:

Small baked potato; ½ tsp. butter
1 shirred egg
1 heaping tbsp. purée of string beans
1 slice toast; ½ tsp. butter
Average helping Jello; 1 tbsp. whipping cream
1 glass milk

4:00 P.M.:

1 glass milk

Supper:

2 tbsp. cream of wheat; ¼ cup whole milk
1 toasted plain muffin
Apple whip (1 tbsp. each of apple sauce and whipping cream)
1 glass milk

Bedtime:

1 glass milk; 2 small crackers

SPECIMEN DIET II

7:00 A.M.:

1 cup hot water with fruit juice

Breakfast:

Average helping oatmeal with cream and sugar
1 slice toast; 1 tsp. butter; apple sauce
1 cup cocoa (no cream)

10:00 A.M.:

Milk shake (1 egg with whole milk)

Dinner:

½ cup beef juice; 2 crackers
Spaghetti and tomato
1 piece zwieback
1 tsp. sieved apricot sauce; 2 tbsp. soft custard
1 glass milk

4:00 P.M.:

1 glass milk shake

Supper:

1 slice milk toast
½ cup milk
Jello with whipping cream
Cocoa or milk

Bedtime:

Prune whip (4 sieved prunes mixed with 1 tbsp. whipping cream)
1 glass milk

SPECIMEN DIET III

7:00 A.M.:

Hot water with fruit juice

Breakfast:

Average helping well-cooked farina; whole milk and sugar
2 small toasted gems with butter and preserves
Cocoa or milk

10:00 A.M.:

1 glass milk; ½ slice toast; apple sauce

Dinner:

Mashed potatoes
1 coddled egg
Average helping purée of squash
1 slice toast
Orange jello with whipping cream
1 glass milk

4:00 P.M.:

Baked custard; 2 butter wafers

Supper:

1 heaping tbsp. boiled rice
1 slice toast
Stewed apples
2 pieces zwieback; 1 tsp. butter
1 glass milk

Bedtime:

1 glass milk shake (1 egg)

CIRRHOSIS OF THE LIVER

In cirrhosis of the liver there is destruction, to a greater or less extent, of the liver cells.

Cause The generally accepted cause of cirrhosis is alcoholic addiction, although it may be attributed to other dietary indiscretions.

Diet This condition demands rigid dietary restriction. Alcohol is absolutely prohibited, and highly seasoned foods containing pepper, mustard, or other condiments should be avoided. The general dietary rules and menus for all forms of liver impairment apply also to cirrhosis.

Liberal amounts of protein should be supplied. The fat content should be low and the amount of carbohydrate adequate. Particular attention should be given to foods rich in thiamine and other members of the B complex. Supplements of these vitamins may be recommended by the physician.

SUGGESTED MENU FOR PATIENTS WITH CIRRHOSIS OF THE LIVER[4]

7 A.M.	Milk	200 c.c.
8 A.M.	Cereal (Pablum)	100 grams
	Sugar	12 grams
	20% cream	30 c.c.
	Egg, ½	2
9 A.M.	Orange juice	200 c.c.
10 A.M.	Eggnog	
	Milk	150 c.c.
	Egg	1
	Sugar	10 grams
	Brewers' yeast	25 grams
11 A.M.	Cream soup	200 c.c.
	Mashed potatoes	100 grams
	Butter	10 grams
	Puréed vegetables	100 grams
	Orange juice	200 c.c.
Noon	Cocomalt	200 c.c.
2 P.M.	Eggnog	200 c.c.
3 P.M.	Orange juice	200 c.c.
4 P.M.	Cereal (Pablum)	100 grams
	Sugar	12 grams
	Cream 20%	30 c.c.
	Jello	100 grams
	Cream 20%	30 c.c.
	Orange juice	200 c.c.
5 P.M.	Cocomalt	200 c.c.
6 P.M.	Eggnog	200 c.c.
	Brewers' yeast	25 grams
7 P.M.	Eggnog	200 c.c.

[4] McLester, *op. cit.*

DISEASES OF THE GALLBLADDER

The gallbladder is the reservoir for storing bile. It seems to be rela tively unimportant and may be removed without serious consequences Sometimes small concretions known as gallstones are precipitated, bu even the presence of a gallstone is not of great moment unless the irri tation it causes leads to infection or unless it impedes the flow of bile.

However, since gallstones usually produce inflammation of the gall bladder, an operation for their removal is often advisable.

Effect of diet Stones once formed are not influenced by diet so far a we know, but dietary measures are important in preventing their forma tion in the first place or in preventing their recurrence after operation For the prevention of gallstones the rate of bile flow should be normal and it is important to avoid constipation and intestinal putrefaction which may set up inflammatory processes.

Rules for diet The same general rules for diet in liver disorders apply in cases of gallstones. The meals should be small and frequent Irritating foods should be avoided and care taken not to overtax the liver by fat. The liberal use of milk, fruits, and vegetables will aid in keeping the bowels open.

In cases of inflammation of the gallbladder, the diet is that suitable in chronic or subacute gastritis. Fat is kept low. During the acute stage milk, cereals, milk toast, toast, zwieback, cooked fruits, rice, and potatoes should be given. Occasionally eggs are well borne from the beginning.

When the inflammatory reaction is less acute, tender meats and the simpler vegetables may be added. All highly seasoned foods, fried foods and pastries should be avoided.

MENUS FOR PATIENTS WITH DISEASE OF THE GALLBLADDER[5]

SPECIMEN DIET I

7:00 A.M. (or before):
   Hot lemon water

Breakfast:
   Average helping farina; cream and sugar
   1 coddled egg
   2 small popovers; ½ tsp. butter; preserves
   Cocoa or milk

[5] McLester, *op. cit.*

10:30 A.M.:
- Small helping tenderloin steak (about 2 oz.)
- Small baked potato
- Average helping purée of spinach
- Average helping Snow Pudding
- 1 glass milk

4:00 P.M.:
- 1 cup cocoa; 2 butter wafers

Supper:
- 1 slice creamed toast
- Well-cooked and mashed carrots
- 2 halves canned peaches
- 1 glass milk

Bedtime:
- 1 glass milk; 3 tbsp. boiled custard

SPECIMEN DIET II

7:00 A.M. (or before):
- Hot fruit water

Breakfast:
- Average helping well-cooked oatmeal; cream and sugar
- Shirred egg; 1 slice crisp, drained bacon
- 1 slice toast; ½ tsp. butter; jelly or jam
- Cocoa or milk

10:30 A.M.:
- 1 glass milk

Dinner:
- Small helping broiled white fish
- 2 heaping tbsp. creamed potatoes
- Average helping purée of green beans
- 1 slice dry toast
- Baked apple without skin and core
- 1 glass milk

4:00 P.M.:
- 1 glass milk, 3 small crackers

Supper:
- 1 egg omelet
- Purée of baked squash
- 2 small plain muffins; 1 tsp. jelly or honey
- 1 glass milk

Bedtime:
- 1 glass milk

SPECIMEN DIET III

7:00 A.M. (or before):
  Hot lemon water

Breakfast:
  Average helping cream of wheat; cream and sugar
  1 scrambled egg
  2 small slices toast; apple sauce
  Cocoa or milk

10:30 A.M.:
  1 glass milk

Dinner:
  1 medium-sized very tender broiled lamb chop (no fat)
  1 tbsp. steamed rice; 1 tsp. butter
  Average helping tapioca pudding
  Sliced tomato (no dressing)
  1 slice toast
  1 glass milk

4:00 P.M.:
  1 glass milk with crackers

Supper:
  Average helping Ralston breakfast food; whole milk
  Creamed asparagus tips on toast
  2 tbsp. Floating Island
  1 glass milk

Bedtime:
  Baked custard; 1 glass milk

QUESTIONS FOR STUDY

THE LIVER

1. What are the functions of the liver?
2. What dietary rules apply to all liver disorders?
3. What is catarrhal jaundice?
4. Discuss the diet in catarrhal jaundice.
5. What is cirrhosis of the liver? What causes it? What dietary restrictions apply to it?
6. What is the gallbladder? What are gallstones?
7. Discuss the diet in gallstones and in inflammation of the liver.

11.
DIETARY MANAGEMENT OF SURGICAL CASES [1]

Diet preceding operations The diet preceding operations should be one which will maintain good nutrition or improve the nutrition of an undernourished patient. This is especially important if the patient will have to be starved for some days after the operation.

Where the situation is complicated by a disease requiring a special diet, such as diabetes or nephritis, the dietary restrictions necessary for this condition should be made.

Other than this, the only precaution to be observed is to make sure that the stomach is empty when the anesthetic is given. The normal stomach empties itself completely within 5 hours after solid food is given and 2 to 3 hours after fluids. The last meal is usually given about 6 hours before the operation.

There need be no rigidly prescribed preoperative diet. Any easily digested food which leaves only a small residue may be used. The usual supper menu is allowed the night before a morning operation, and an ordinary breakfast may be served when the operation is to be performed in the afternoon. Liberal amounts of carbohydrate-rich foods, especially candy, should be given, and the patient should drink plenty of water.

Diet after operations Unless the operation involves some part of the digestive tract, no special diet is necessary. No food is offered as long as nausea and vomiting persist. Water may be given frequently in small amounts. If it is given one-half ounce at a time, every half-hour, it will often be retained when larger amounts would be vomited.

The usual procedure when feeding is begun is to give a liquid diet at first, consisting of small quantities of broth, albumin water, gruel, and fruit juices, and a soft diet a few days later. The earlier we can have the patient take solids, the earlier will he be free from gas.

After all operations except those on the gastro-intestinal tract, a soft diet is recommended as soon as the patient is able and willing to eat.

[1] This chapter was prepared by Dr. John F. Erdmann, visiting surgeon to the Post Graduate Hospital of Columbia University, New York City. Approved by Dr. Erdmann, 1944.

The practice of feeding fluids, some of which may be distasteful to the patient, may prolong the period of nausea. If the patient is not inclined to take food during the first 24 hours after the operation, Erdmann advises giving nothing but water. The body's need of fluid may be met by giving water by rectum, or salt solution subcutaneously.

During warm weather Erdmann advises pushing fluids by all available routes, such as by hypodermoclysis, by intravenous drip, by rectum, and, if there is no vomiting, by mouth.

After abdominal operations These rules apply especially to all gastro-intestinal operations and others in which there is an active or possible infection of the peritoneal cavity.

No food or fluid should be given in any case for from 24 to 48 hours. This prevents stimulation of peristalsis. If extensive infection of the peritoneum exists, it is wise, at least in the case of well-nourished patients, to give nothing by mouth for from 3 to 5 days, depending on the severity of the infection.

While food is being withheld, fluid is given by hypodermoclysis and protoclysis.

Glucose is sometimes administered intravenously in 5 to 10 per cent strength in normal salt solution. These infusions are given in quantities of 1000 c.c., two or three times a day. One may also use a 3 per cent glucose solution under the skin as a hypodermoclysis.

After the removal of the appendix or gallbladder, fluids and solid food may be given in from 36 to 48 hours after operation if there are no symptoms of peritoneal infection, if the pulse rate has progressively decreased since the time of operation, and if nausea and vomiting have disappeared.

In case of peritonitis, Erdmann prefers to give no fluids by mouth but relies on rectal injections of 3 ounces of normal saline with 3 ounces of tap water every 4 hours. This is supplementary to the administration of fluids by the intravenous and subcutaneous routes.

In all cases, when the infection of the peritoneal cavity has subsided, it is best to begin with small amounts of water, given frequently. After this has been done for from 8 to 12 hours, a liquid diet may be given, provided there is no sign of increasing peritonitis. If this is not well tolerated, it is best to discontinue it and give nothing but water until the patient is able to take a soft diet. This is given at first in small quantities of easily digested foods, gradually increasing the amounts until the energy requirement is met, and is continued until the patient has completely recovered from the operation, which, in most cases, will be approximately 3 weeks.

SUGGESTED POSTOPERATIVE DIETS [2]

DIET NO. I

			PROTEIN (*grams*)	FAT (*grams*)	CARB. (*grams*)	CALORIES
7 A.M.	Hot milk	200 c.c.	6.6	8.8	10.0	138.40
9 A.M.	Oatmeal gruel	100 c.c.				
	with milk	100 c.c.	4.5	4.4	11.3	102.80
	Coffee with cream	25 c.c.				
	with cane sugar	8 gm.	0.55	10.0	8.75	127.2
11 A.M.	Orange juice	50 c.c.				
	Lemon juice	25 c.c.				
	Lactose	50 gm.				
	Water	150 c.c.	0.4	0.1	58.25	235.5
1 P.M.	Chicken broth	150 c.c.	5.4	0.5	2.25	35.10
	Cocoa	5 gm.				
	with lactose	30 gm.				
	with cream	50 c.c.				
	with milk	100 c.c.	5.48	25.44	38.38	404.40
3 P.M.	Buttermilk	200 c.c.	6.0	1.0	9.58	71.32
5 P.M.	Grape juice	125 c.c.				
	with lactose	25 gm.	..	..	31.25	125.00
7 P.M.	Cream of tomato soup	150 c.c.	10.65	42.64	41.05	590.56
	Soft-cooked egg	50 gm.	5.95	4.65	..	65.55
9 P.M.	Hot milk	150 c.c.	4.95	6.0	7.50	103.80
			50.48	102.93	212.06	1999.73

TIME	FROM THE KITCHEN	AMOUNT	FROM THE FLOOR	AMOUNT
7 A.M.	....		Hot milk	1 glass
9 A.M.	Oatmeal gruel with milk	1 serving		
	Coffee with cream and sugar	1 cup		
11 A.M.	....	....	Orangeade with lactose	1 glass
1 P.M.	Chicken broth	1 bowl		
3 P.M.	....	....	Buttermilk	1 glass
5 P.M.	Cream soup	1 bowl		
	Soft cooked egg...	1 egg		
7 P.M.	....	....	Grape juice with lactose	1 glass
9 P.M.	....	....	Hot milk	1 cup

[2] Vaughan & VanDyke, "Post-operative Dietotherapy," in *American Journal of Medical Science*. Approved by Dr. Erdmann, 1944.

DIET NO. II

			PROTEIN (*grams*)	FAT (*grams*)	CARB. (*grams*)	CALORIES
7 A.M.	Chicken broth	100 c.c.	3.6	0.1	1.5	21.30
9 A.M.	Soft-cooked egg	50 gm.	5.95	4.65	..	65.65
	Oatmeal gruel	100 c.c.	1.2	0.4	6.3	33.60
	Coffee with cream	25 c.c.				
	and cane suger	8 gm.	0.55	10.0	8.75	127.20
11 A.M.	Grape juice	150 c.c.	..	..	37.50	150.00
1 P.M.	Cream of green pea					
	soup	200 c.c.	15.56	56.88	88.04	806.32
	Orange juice	50 cc.				
	with lemon juice	25 c.c.				
	with lactose	50 gm.				
	with water	150 c.c.	0.4	0.4	58.25	235.80
3 P.M.	Beef juice	100 c.c.	4.90	0.60	..	25.0
5 P.M.	Malted milk	12 gm.				
	with cocoa	5 gm.				
	with lactose	25 gm.	4.13	4.30	4.1	191.26
	Soft poached egg	50 gm.	5.95	4.65	..	65.65
7 P.M.	Boiled custard	100 gm.	6.27	6.32	31.35	207.36
9 P.M.	Barley water	200 c.c.	15.56	56.88	58.04	806.35
			49.03	88.11	239.34	1946.47

TIME	FROM THE KITCHEN	AMOUNT	FROM THE FLOOR	AMOUNT
7 A.M.	....	....	Chicken broth	1 cup
9 A.M.	Oatmeal gruel	1 serving		
	Soft-cooked egg ...	1 egg		
	Coffee with sugar and cream	1 cup		
11 A.M.	....	....	Grape juice	1 glass
1 P.M.	Cream soup	1 bowl		
	Orangeade	1 glass		
3 P.M.	....	....	Beef juice	1 cup
5 P.M.	Chocolate malted milk	1 glass		
	Soft poached egg . .	1 egg		
7 P.M.	Boiled custard ...	1 cup		
9 P.M.	....	....	Barley water	1 cup

DIET NO. III

			PROTEIN (*grams*)	FAT (*grams*)	CARB. (*grams*)	CALORIES
7 A.M.	Orange juice	100 c.c.	0.8	0.2	28.07	117.28
	Lemon juice	15 c.c.				
	Lactose	15 gm.				
9 A.M.	Cream toast	30 gm.				
	with milk	100 c.c.				
	with butter	1 oz.				
	with flour	1 oz.	7.78	12.49	7.45	173.33
	Poached egg	50 gm.	5.95	4.65	..	65.65
11 A.M.	Chicken broth	100 c.c.				
	with cracker	10 gm.	4.58	1.01	8.81	62.65
1 P.M.	Cream of pea soup	200 c.c.	15.56	56.88	58.04	806.35
3 P.M.	Oatmeal gruel with milk	100 c.c.	8.72	8.10	21.83	195.10
5 P.M.	Poached egg on toast	20 gm.	7.87	13.39	10.54	•194.15
	Butter	10 c.c.				
7 P.M.	Baked custard	100 gm.	7.60	6.65	12.50	140.25
9 P.M.	Malted milk	12 gm.				
	with cocoa	5 gm.				
	with lactose	25 gm.	10.39	11.56	48.07	237.88
			69.25	114.93	195.93	2092.81

TIME	FROM THE KITCHEN	AMOUNT	FROM THE FLOOR	AMOUNT
7 A.M.	....	....	Orangeade with lactose	1 glass
9 A.M.	Cream toast	1 serving		
	Poached egg	1 egg		
11 A.M.	....	....	Chicken broth with cracker	1 glass
1 P.M.	Cream soup	1 bowl		
3 P.M.	Oatmeal gruel with milk	1 serving		
5 P.M.	Poached egg on toast with butter	1 serving		
7 P.M.	Baked custard	1 serving		
9 P.M.	....	....	Chocolate malted milk	1 glass

DIET NO. IV

			PROTEIN (*grams*)	FAT (*grams*)	CARB. (*grams*)	CALORIE
7 A.M.	Baked apple	120 gm.	0.61	0.58	29.30	124.86
9 A.M.	Wheat farina	100 c.c.				
	with milk	100 c.c.				
	with lactose	15 gm.	14.50	5.40	96.30	491.0
	Toast with milk	100 c.c.				
	Toast	40 gm.	7.12	12.54	7.10	169.74
11 A.M.	Plain rennet-custard	100 gm.	3.30	4.0	19.67	127.88
1 P.M.	Creamed fish	50 gm.	17.48	18.83	26.24	344.35
	with white sauce	100 c.c.				
	Purée of spinach	100 gm.	2.10	4.10	2.60	55.70
3 P.M.	Apricot soufflé		6.37	21.56	17.85	290.92
5 P.M.	Chicken broth	100 c.c.				
	with rice	50 gm.	5.0	0.60	1.50	31.40
	Poached egg	50 gm.				
	on toast	20 gm.				
	with butter	10 c.c.	7.87	13.39	10.54	194.15
7 P.M.	Stewed prunes	100 gm.	0.50	0.10	22.30	92.10
9 P.M.	Barley gruel with milk	120 gm.	5.94	6.41	13.25	134.45
			70.59	87.51	246.65	2056.55

TIME	FROM THE KITCHEN	AMOUNT	FROM THE FLOOR	AMOUNT
7 A.M.	Baked apple	1 large		
9 A.M.	Wheat farina with sugar and milk . .	1 serving		
	Milk toast	1 serving		
11 A.M.	Plain rennet-custard	1 cup		
1 P.M.	Creamed fish	1 serving		
	Purée of spinach . .	1 serving		
3 P.M.	Apricot soufflé	1 serving		
5 P.M.	Chicken broth with rice	1 bowl		
7 P.M.	Stewed fruit	1 serving		
9 P.M.	Barley gruel with milk	1 serving		

QUESTIONS FOR STUDY

1. What type of diet is used before operations?
2. Discuss the use of carbohydrates and fluids before an operation.
3. Describe the usual plan of feeding after operations which do not involve the digestive tract.
4. Describe Erdmann's post-operative diet.
5. Describe the proper dietary care of a patient after abdominal operations.
6. What type of foods must sometimes be omitted?

12.
OBESITY AND EMACIATION [1]

OBESITY

Obesity is a condition in which, due to deposition of fat in the tissues the weight of a person exceeds by 15 per cent or more that of the norma individual for the same age and height. These excessive fat deposits no only mar the appearance of the individual but decrease his physica efficiency and may indicate fundamental disturbances of body function The need for giving attention to such cases is indicated by statistics o life-insurance companies showing a shortened life expectancy for the obese person.

Classification and etiology In general, obesity comes about when the energy value of the ingested food exceeds the energy expenditure of the body. This imbalance may occur in all degrees from mild to severe. In mild conditions the excess fat is deposited in the normal fat depots of the body; in the more severe forms, it may appear in the heart and liver.

Obesity is classified under two groups, *exogenous* and *endogenous.*

In obesity of *exogenous* origin, the rate of oxidation in the body— that is, the rate of release of energy—is normal. The energy value of the ingested food simply exceeds energy expenditure. This may be due merely to overeating or to an unaccustomed decrease in bodily activity with consequent decrease in energy requirement and no compensating decrease in food intake.

The second type, *endogenous* obesity, is due to bodily dysfunction usually involving one or more of the endocrine glands. The rate o tissue oxidation is lowered, resulting in a decreased rate of energy ex penditure but without an accompanying decrease in energy intake.

Treatment The first step in the treatment of obesity is a reductio in the caloric intake below the individual's energy requirement. Th

[1] This chapter was prepared by Doris Johnson, M.S., teaching dietitian and war supervisor, Presbyterian Hospital, New York City.

body store of fat is then drawn upon for the additional calories needed. The reduction may be accomplished either by decreasing the food intake or by increasing energy expenditure through exercise, or both. Thus exercise and a low-calorie diet are indicated in treatment.

Exercise Because of the sedentary habits of most obese individuals, the inclusion of regular exercise as part of the treatment is advisable. This may be done by regular gymnastic exercises, taking long walks, playing golf or tennis, or gardening. If some factor other than obesity enters in, such as age or cardiac conditions, the use of exercise must be guarded.

DIET FOR THE OBESE

Calories The total calories of the diet are estimated on the basis of the accepted normal weight for an individual of the age and height of the patient.[2] Thus, the average normal energy requirement will be, depending upon the activity, age, and height of the person, between 2000 and 3000 calories per day. In order to bring about loss of weight, it will be necessary to consume food furnishing somewhat less than this amount. If the individual is not extremely obese, and if there is no reason for a rapid reduction, a diet of 1200 to 1800 calories per day will bring about a loss of weight of 1 to 3 pounds per week. When the individual is extremely obese, or a rapid loss of weight is desired, diets of 600 to 800 calories per day may be used. Patients on such strict regimes should, of course, be under the constant observation of their physician.

Protein The protein of a low-calorie diet should meet the accepted standard of 1 gram per kilogram of body weight. Thus a patient whose normal body weight for height and age is 65 kilograms should have 65 grams of protein per day. The protein should be divided so that at least one-half of it comes from complete protein foods. A diet containing 1 pint of milk, 1 egg, and 6 to 8 ounces of lean meat, fish, fowl, or cottage cheese each day will supply this amount.

Fat and carbohydrate The remaining calories after the protein has been calculated are divided approximately equally between the carbohydrate and the fat. A 1200-calorie diet with 65 grams of protein then has 110 grams of carbohydrate and 55 grams of fat. Such a division allows for inclusion of sufficient fruits, vegetables, and whole-grain cereals to meet the mineral and vitamin requirements as well as supply

[2] See height and weight tables, pages 706, 707.

enough bulk or cellulose to the diet. The amount of fat is of necessity low, but a teaspoon of butter per meal can be included in this amount.

Water and salt Water and salt need not be restricted in a low-calorie diet unless there are cardiac complications. For the usual obese patient, the restriction of water and salt only brings about an apparent loss of weight due to alteration in the water balance. No real loss of fatty tissue has occurred, and as soon as water is taken the body weight will return to what it was previously.

Warnings in treatment of obesity The treatment of obesity, like any disease, must be carried out according to a logical and sane procedure. This is not always done, and the results are sometimes disastrous.

Medication Drugs, medicines, or other remedies to aid weight reduction should not be taken except under the advice of a physician, since they may cause injury to the body more serious than the obesity. Endocrine-gland preparations such as desiccated thyroid along with diet is sometimes used in the treatment of the endogenous type of obesity, but should never be taken unless prescribed by a physician.

Unusual diets Although dietary management is essential in the treatment of obesity, this must be done on a sound basis. Diets of the faddist type are often described for bringing about rapid loss of weight. Such diets are usually entirely unbalanced in nutritive content. The drastic weight reduction resulting from their use may please the weak-willed patient who is unwilling to revise his dietary habits, but injuries more serious than obesity may be incurred. Weight reduction in excess of 2 to 3 pounds per week should not be undertaken except in cases of emergency and then only as directed by a physician.

PLANNING THE DIET

The prime requisite in the dietary management of obesity is that the diet shall be adequate. It must supply protein, minerals, and vitamins in the required amounts.

Obese persons have usually consumed excessive amounts of food. One of the problems to be dealt with in treatment by a low-calorie diet is the feeling of hunger that follows. Vegetables and fruits used liberally supply bulk and tend to allay the hunger pangs by giving a feeling of fullness. Individuals accustomed to a diet of high-calorie foods, when given a low-calorie diet made up of foods high in bulk, may even complain that they are receiving too much food.

Patients on a low-calorie diet should be advised to eat regularly 3 meals a day and not to eat between meals.

The use of a diet outline greatly facilitates the planning and teaching of the diet. As an example, a plan for a 1200-calorie diet is given below. Where foods are designated by type, specific items are selected from the lists of foods allowed.

1200-CALORIE DIET[3]

(65 grams protein)

DIET OUTLINE	MENU
Breakfast:	Breakfast:
Fruit, 1 portion *	Orange juice, ½ cup
Egg, 1	Poached egg, 1
Whole-wheat toast, 1 slice	Whole-wheat toast, 1 slice
Butter, 1 tsp.	Butter, 1 tsp.
Black coffee or tea	Black coffee
Luncheon:	Luncheon:
Lean meat, fish, or cottage cheese, 4 oz.	Cottage cheese, 4 oz.
Vegetables, 3%-6%-9%,† 2 large servings	Sliced tomato, 1
Fruit, 1 portion *	Lettuce leaf, 1
Whole-wheat bread, 1 slice	Lemon garnish
Butter, 1 tsp.	String beans, 1 large serving
Milk, 1 glass	Fresh peach, 1 medium-sized
	Whole-wheat bread, 1 slice
	Butter, 1 tsp.
	Milk, 1 glass
Dinner:	Dinner:
Lean meat, fish, or poultry, 4 oz.	Consommé
Potato, ½ cup (1 medium-sized)	Lean roast beef, 4 oz.
Vegetables, 3%-6%-9%,† 2 large servings	Baked potato, 1 medium-sized
Fruit, 1 portion *	Butter, 1 tsp.
Butter, 1 tsp.	Carrots, 1 large serving
Milk, 1 glass	Asparagus, 1 large serving
	Grapefruit, ½
	Milk, 1 glass
Water: 6-8 glasses each day	

* See table.
† See list.
[3] For weight and nutritive value of items, see Table 1, p. 637.

PORTIONS OF FRUIT

(1 portion equals any one of the following)

All fresh fruit or unsweetened		
½ apple	1 medium orange	2 dates
⅓ cup applesauce	1 medium peach	1 medium-sized fig
2 apricots	½ pear	2 prunes
½ medium-sized banana	½ cup pineapple	
⅔ cup blackberries	2 medium-sized plums	*Unsweetened juices*
½ cup blueberries	½ cup raspberries	1 cup tomato juice
½ cantaloupe	⅔ cup strawberries	½ cup grapefruit juice
½ cup sour cherries	½ slice watermelon	⅓ cup pineapple juice
⅓ cup sweet cherries		⅓ cup apple juice
½ grapefruit	*Dried, unsweetened*	⅓ cup apricot juice
¼ honeydew melon	4 halves apricots	½ cup fresh orange juice

Foods to be avoided

Ale	Hot breads	Pudding
All cooking fats	Ice cream	Pancakes
Bacon	Jam	Pop
Beer	Jelly	Rice
Cakes	Marmalade	Salad dressing
Candy	Macaroni	Sausage
Cookies and crackers	Meat stuffings or dressings	Sweet rolls
Chocolate	Malted milk	Spaghetti
Doughnuts	Noodles	Soda waters
Fat fish, as sardines and other fish canned in oil	Nuts	Sour cream
	Oil	Sweet cream
Fat meats	Olives	Sugar
Fried foods	Potato chips	Syrup
Gravy	Popcorn	Thick soups
Griddle cakes	Pie	Whisky
Honey	Pastry	Wine

Foods that have little or no food value These may be used as desired.

Clear broth, bouillon, consommé	Vinegar
Tea	Lemon garnish
Coffee	Gelatin desserts made with lemon juice or coffee and saccharine
Saccharine for sweetening	
Mushrooms	

Substitutions for a slice of bread or its equivalent The following may be used as substitutions to add variety to the diet.

Cereal, ½ cup cooked	Crackers, 4 sodas or 6 saltines
Cereal, 1 cup prepared	Peas, ½ cup
Potatoes, ½ cup (1 medium-sized)	Parsnips, ½ cup
Corn, 1 8″ ear	Lima beans, ⅓ cup

MODIFICATIONS OF THE 1200-CALORIE DIET OUTLINE [4]

For 800-Calorie, 1000-Calorie, and 1500-Calorie Diets

800-CALORIE DIET

(65 grams protein)

Using 1200-calorie diet as a basis, omit:

Bread, 1½ slices
Butter, 2 teaspoons
Potato, ½ cup

Substitute 2 glasses skimmed milk for the 2 glasses whole milk.

This diet is inadequate in vitamins A and B, and concentrates should be used.

1000-CALORIE DIET

(65 grams protein)

Using 1200-calorie diet as a basis, omit:

Potato, ½ cup
Bread, 1½ slices

1500-CALORIE DIET

(75 grams protein)

Using 1200-calorie diet as a basis, add:

Cereal, ½ cup, cooked
Milk for cereal, ½ cup
Butter, 1 teaspoon
Substitute a dessert for the fruit at dinner.

EMACIATION

Underweight, or emaciation, is a condition of malnutrition in which the weight of a person is 10 per cent or more below that of the normal individual for the same age and height.[5]

An underweight person shows loss of body fat, atrophy of the muscle

[4] Adapted from the *Manual of Diets,* Presbyterian Hospital, New York, 1943.
[5] See height and weight tables, pages 706, 707.

tissues, predisposition to disease, and premature aging. In the youn there is retarded growth. Fatigue and irritability are common accom paniments of underweight.

Etiology Underweight may be due to a variety of causes. One o these is not eating a sufficient amount or the right kinds of food t meet the energy expenditures of the body. This may be due to economi factors in that the person cannot afford to buy enough food, or it ma be due to a lack of knowledge or indifference as to what foods to eat Very often, when underweight is due to these causes, other deficienc diseases are found as well. Pathological conditions such as pneumonia typhoid fever, tuberculosis, and anemia are causes of underweight Obviously in such cases the disease itself must be treated first in orde to bring about a gain in weight. Anatomical deformities of the gastro-intestinal tract which prevent either the eating of enough food or the absorption of the food that is eaten, may be a cause of underweight Endocrine gland disturbances, particularly an overactive thyroid gland may cause a loss of body weight because of the greatly increased metabolism of the body.

Treatment The treatment of underweight, after any predisposing factors have been removed, is by increasing the caloric intake above the normal energy requirements of the individual so that there will be storage in the body tissues. Thus the treatment indicated is a high-calorie diet and rest.

Rest Because exercise requires the expenditure of energy, regular periods of rest for the underweight person are indicated in order to lessen the total energy requirement. Naps during the day and long hours of sleep at night are extremely important.

DIET FOR THE UNDERWEIGHT

Calories The total calories of the diet are based on the ideal weight of the individual. Since the average normal requirement for calories will be between 2000 and 3000 per day, it will be necessary to consume food supplying more than this amount before any gain in weight is possible. Often it is necessary to have a diet of 4000 to 5000 calories a day before a gain in weight can be brought about.

Protein The protein of the high-calorie diet should meet the accepted standard of 1 gram per kilogram of ideal weight. If there has been a considerable wasting of body tissue along with the loss of body

weight, it may be necessary to increase the protein intake somewhat. Thus, a person whose ideal weight is 65 kilograms, should have not less than 65 grams of protein per day. As in the case of the low-calorie diet, at least one-half of the protein should come from complete protein foods.

Fat and carbohydrate Fat and carbohydrate supply the remaining calories after the protein requirement of the diet has been met. Both fat and carbohydrate are made into body fat and when fed in sufficient amounts soon bring about a gain in body weight.

PLANNING THE DIET

As in the case of the low-calorie diet, the high-calorie diet must be planned so that it meets all the requirements of the normal diet for minerals, vitamins, and cellulose, as well as protein. Many underweight people do not have a very large appetite, and it is advisable to use as concentrated and easily digested foods as possible for the extra calories in the diet. Fat-containing foods such as butter, cream, milk, and salad dressings are well taken by most underweight persons. High-carbohydrate foods such as jelly, jams, honey, cereals, puddings, dried fruits, breads, and candy are used as much as possible. Less sweet sugars such as lactose and dextrose can be used in large amounts for sweetening without interfering with the flavor of the food.

Because the underweight person cannot always eat large amounts of food at one time it is advisable to have between-meal feedings. These should be such as not to interfere with the regular meals and may be milk drinks of various kinds supplemented with crackers, cookies, or sandwiches.

4000-CALORIE DIET[6]

(100-110 grams protein)

DIET OUTLINE

Breakfast:

Fruit, 1 serving
Cereal with milk and sugar, 1 serving
Egg, 1
Butter, 2 pats
Whole-wheat bread or rolls, 2
Marmalade or jelly, 1 tablespoon
Cocoa or coffee with cream and sugar

[6] Adapted from the *Manual of Diets,* Presbyterian Hospital, New York, 1943.

4000-CALORIE DIET—Continued

10 A.M.:

High-calorie nourishment (see list)

Luncheon:

Cream soup with 1 pat butter or margarine
Egg or substitute of cheese, meat, or fish, 1-2 ounces
Potatoes, rice, noodles, spaghetti, or macaroni with 1 pat butter, 1 serving
Salad with dressing
Whole-wheat bread, 2 slices
Butter, 2 pats
Jelly, 1 tablespoon
Fruit, 1 serving
Milk (½ cream), 1 glass

2 P.M.:

High-calorie nourishment (see list)

Dinner:

Meat, fish, or fowl, 4 ounces
Potato with 1 pat butter, 1 serving
Vegetable with 1 pat butter, 1 serving
Dessert, 1 serving
Whole-wheat bread, 2 slices
Butter, 2 pats
Milk (½ cream), 1 glass

8 P.M.:

High-calorie nourishment (see list)

HIGH-CALORIE NOURISHMENTS

Cocoa made with ½ cream or evaporated milk and sweetened with dextrose
Eggnog made with ½ cream and sweetened with dextrose
Milk made with ½ 20% cream
Milk shake
Malted milk
Fruit juices sweetened with dextrose
Sandwiches, crackers, and cookies can be served with these when the patient will take them.

MENU

Breakfast:

Orange juice, ½ glass
Oatmeal with milk and sugar, 1 serving
Poached egg, 1
Whole-wheat toast, 2 slices
Butter, 2 pats
Jam, 1 tablespoon
Coffee with cream and sugar, 1 cup

10 A.M.

Eggnog and Nabiscos

Luncheon:

Cream of pea soup with crackers and butter, 1 serving
Macaroni and cheese, 1 large serving
Tomato salad with mayonnaise, 1 serving
Peaches, 1 serving
Whole-wheat bread, 2 slices
Butter, 2 pats
Milk (1/2 cream), 1 glass
Jelly, 1 tablespoon

2 P.M.:

Malted milk

Dinner:

Roast beef with gravy, 4 ounces
Baked potato with 1 pat butter, 1 serving
Carrots with 1 pat butter, 1 serving
Ice cream, 1 serving
Whole-wheat bread, 2 slices
Butter, 2 pats
Milk (1/2 cream), 1 glass

8 P.M.:

Cocoa and jelly sandwich

QUESTIONS FOR STUDY

OBESITY

1. What are the causes of obesity?
2. Why is it inadvisable to become obese?
3. When is a person considered to be obese?
4. How is obesity treated?
5. What are the requirements of a diet to treat obesity?
6. What foods should be avoided on a low-calorie diet? What ones emphasized?
7. Plan a day's menu for a 1200-calorie diet.
8. How may a 1200-calorie diet be modified to make an 800-calorie diet? 1000-calorie diet? 1500-calorie diet?

EMACIATION

1. What are the causes of underweight?
2. How is underweight treated?
3. What are the requirements of a diet to treat underweight?
4. What foods should be emphasized on a high-calorie diet? What ones avoided?
5. Plan a day's menu for a 4000-calorie diet.

13.
DIABETES MELLITUS [1]

Definition "Diabetes is a hereditary disease characterized by an in crease of sugar in the blood and the excretion of sugar in the urine; it is dependent upon disease of the pancreas particularly of the islands of Langerhans which are functionally interrelated with other endocrine glands and the liver; the secretion of the islands of Langerhans—insulin—not only promotes the normal storage of glycogen in the liver, muscles, and skin, and the combustion of glucose in the tissues, but also exerts a control upon the metabolism of protein and fat." [2]

The conversion to glucose of carbohydrate is 100 per cent, protein 58 per cent, and fat 10 per cent.

The normal fasting blood-sugar value varies from 70 to 120 and after a meal may reach 160 milligrams per 100 cubic centimeters of blood.

Cause Though the initial cause is still not known, heredity closely associated with obesity in adults and overweight in children is the outstanding factor or precursor of the disease.

Symptoms The usual symptoms of diabetes mellitus are excessive thirst, followed by excessive flow of urine, hunger, loss of weight and strength, and at times itching of the skin. Neglect of treatment of these usual symptoms entails many complications which result in distressing conditions, involving particularly the nerves and arteries, the eyes, the skin, and even the bones.

Functions of the pancreas This gland, known as the sweetbread in animals, has two functions. First, it discharges into the small intestine the most important digestive juice in the body, the pancreatic juice, capable of digesting all kinds of food; and, second, it manufactures

[1] This chapter was prepared by Dr. Elliott P. Joslin, clinical professor of medicine emeritus, Harvard Medical School; medical director, George F. Baker Clinic, New Eng-land Deaconness Hospital, Boston, Mass. Author of *The Treatment of Diabetes Mellitus* and *Diebetic Manual.* Revised by Dr. Joslin, 1944.

[2] E. P. Joslin, M.D., *Diabetic Manual,* 7th ed., Philadelphia: Lea & Febiger, 1941.

insulin, which is discharged into the blood and regulates the use of sugar formed from food.

Islands of Langerhans "These are a group of cells varying in number from a quarter of a million to a million or more in a single pancreas. They are scattered throughout the gland and yet they form but a twentieth part of it. Their total weight is about that of a buffalo nickel or a lump of sugar." [3]

These island cells secrete insulin. With the proper supply of insulin in the blood, the body is able to utilize carbohydrate. When, however, these cells become diseased or exhausted and fail to function, this ability to prepare and store carbohydrate for burning is affected, and sugar accumulates in the blood (hyperglycemia) and escapes into the urine (glycosuria).

INSULIN

Discovery of insulin and protamine zinc insulin An extract of the anterior pituitary gland, when injected into an animal, will destroy the insulin-producing cells, thus causing diabetes; and so, too, it has more recently been shown, will a chemical—alloxan. Important new discoveries are foreshadowed by these facts. In 1921 Dr. F. G. Banting and Dr. C. H. Best, working in the laboratory of Professor MacLeod in Toronto, discovered insulin and successfully extracted it from the pancreas of animals. This discovery revolutionized the treatment of diabetes.

In 1935, after many years of research, Dr. Hagedorn of Copenhagen discovered that protamine (a substance derived from fish sperm), when added to insulin, prolonged its action, thus making it more comparable with nature's insulin. Protamine insulin, now manufactured in this country, is dispensed with an infinitesimal quantity of zinc to prolong the action to 48 hours.

Administration and dosage of insulin Insulin is apparently destroyed by gastro-intestinal enzymes. Therefore it is given by subcutaneous injection into the fleshy parts of the body—arms, legs, buttocks, abdomen, and shoulders. Diabetic patients whose pancreases do not furnish enough insulin and who are therefore unable to live a normal life by restricting diet alone, are dependent upon manufactured insulin. In general, 1 unit of insulin will metabolize 1 or 2 grams of carbohydrate or considerably more.

[3] *Ibid.*

The pancreas, even when diseased, produces some insulin, and the adequate dose for the patient is known only after careful treatment with a regulated diet and trial insulin doses, administered with caution. Regular insulin is given usually in doses from 10 to 50 units in 1, 2, 3, or 4 injections in 24 hours. Protamine zinc insulin is given only once a day in doses varying from $\boxed{10}$ to $\boxed{40}$ units, or even more if needed. Occasionally the severe diabetic, the adolescent diabetic, and those with complications such as infection, acidosis, glandular disease, or hemachromatosis, require greater doses.

Since protamine zinc insulin is released so slowly following injection and is never as suddenly potent as regular insulin, patients with severe diabetes or diabetes of long duration often require a small supplementary dose of regular insulin along with the protamine.

Crystalline insulin is similar in action to regular insulin, but is a purer drug and acts about 7 hours—1 hour longer than regular insulin. The action of protamine zinc insulin is between 24 and 48 hours, and globin insulin acts for somewhat less than a day.

Measuring insulin Insulin is prepared in different strengths, U10, U20, U40, U80, U100, and measured in units. Using a 1-cubic-centimeter syringe marked with divisions into tenths of 1 cubic centimeter:

1 c.c. of U10	insulin contains	10 units	......0.1 c.c.,	1 unit
1 c.c. of U20	insulin contains	20 units	......0.1 c.c.,	2 units
1 c.c. of U40	insulin contains	40 units	......0.1 c.c.,	4 units
1 c.c. of U80	insulin contains	80 units	......0.1 c.c.,	8 units
1 c.c. of U100	insulin contains	100 units	......0.1 c.c.,	10 units

Protamine zinc insulin is prepared in U40 and U80 strengths.

Protamine zinc insulin is a compound formed by the mixture of regular insulin and protamine. Active material is present only in the finely divided, insoluble, milky-white precipitate which settles to the bottom of the vial upon standing. To obtain uniform value from each dose, one must rotate the vial and invert end to end several times immediately before withdrawal of a dose.

HYPOGLYCEMIA, OR INSULIN REACTION

If too much insulin is given, the blood sugar falls below normal, and symptoms appear which result in an insulin reaction.

The cause of an insulin reaction may be (1) an overdose of insulin, sometimes signifying an error in measurement or an increased tolerance for carbohydrate; (2) unusual exercise, because exercise lowers the blood sugar; (3) too little food of carbohydrate content; (4) too long an interval between insulin and food; or (5) slowness or incompleteness of absorption of ingested food because of functional disturbances such as vomiting or diarrhea.

Symptoms of a reaction are hunger, tremor, sweating, nervous instability, numbness or tingling of tongue and lips, double vision, faintness, unsteady gait, unconsciousness, and convulsion. Protamine zinc insulin reactions are more often recognized by symptoms of headache, fatigue and nausea; later, if untreated, they may be followed by unconsciousness and convulsions.

Treatment of insulin reactions *Patients Taking Insulin Should Always Carry Two Lumps of Sugar!*

Treat *early* symptoms with carbohydrate in any form, such as orange juice, lump sugar, Uneeda biscuits, or ginger ale.

Treat *late* symptoms of unconsciousness and convulsion with 0.5 cubic centimeter of adrenalin chloride and repeat if necessary, giving carbohydrate by mouth with return to consciousness.

A smaller dose of adrenalin is employed for a child.

No one should use adrenalin without special authorization by a doctor.

Twenty cubic centimeters of glucose, 50 per cent solution, may be given intravenously by the doctor.

If nausea and vomiting accompany protamine zinc insulin reactions, adrenalin chloride 0.5 cubic centimeter subcutaneously will release glycogen from the liver and may temporarily safeguard the patient from further hypoglycemia, but complete recovery is delayed for several hours until the patient is able to retain carbohydrate.

Prevention of insulin reactions Since insulin reactions may prove injurious to the community as well as the diabetic, preventive measures should be employed to avoid them.

1. Examine urine daily for sugar.
2. Measure insulin accurately.

3. Eat all prescribed food.

4. Take 10 grams additional carbohydrate before unusual exercise and at 2-hour intervals when driving an automobile.

5. Take food within 15 minutes of insulin injection.

6. Follow vomiting and diarrhea with liquids containing carbohydrate.

7. Take midmorning, midafternoon, and evening lunches of 5 to 10 grams carbohydrate.

8. If early-morning reactions after midnight occur with protamine insulin, take slowly absorbable food in late evening to cover a period of hours through the night. Uneeda biscuits, spread with cheese or peanut butter, nuts, or milk are suitable foods.

Breakfast fruit may be taken upon rising to avoid reactions before breakfast.

9. If consciousness is not regained in 15 minutes, call the doctor or take the patient to a hospital.

INSTRUCTIONS FOR GIVING INSULIN SUBCUTANEOUSLY

1. **Sterilization** a. *Boiling:* Lay barrel and plunger of the syringe and hypodermic needle on a piece of cloth in a small saucepan. Cover with cold water and boil for 5 minutes. Pour off the water, being careful not to touch anything in the dish, and allow to cool by standing.

b. *Alcohol:* A covered dish or a bottle in which the syringe and needle are to be kept is boiled for 5 minutes in a large saucepan. Drain off the water and allow to cool by standing. Remove from saucepan without touching the inside of the cover and dish. Into the empty dish or bottle place or suspend the syringe and needle. Keep covered with 70 per cent alcohol constantly. Isopropyl alcohol is the alcohol of choice.

The covered dish, syringe, and needle should be sterilized by boiling once a week.

2. **Loading** Wash the hands thoroughly with soap and water.

Insert the plunger into the barrel, being careful not to touch the surface which enters the barrel and thus contaminate it. Pick the needle up by the butt and place it on the barrel firmly, turning it slightly to the left.

Wipe off the top of the insulin bottle with a piece of cotton or gauze wet with 70 per cent alcohol.

Push the needle cautiously but firmly through the indentation in the

rubber cap, invert the bottle, and, by pulling the plunger downward slowly, withdraw the required amount of insulin.

If a bubble of air appears in the syringe, expel the insulin back into the bottle and withdraw the plunger a second time.

Holding the syringe as you would a pencil, tip the syringe and needle downward and withdraw the needle from the rubber cap.

3. **Injection** The desirable site for injecting insulin is the outer aspect of the thighs or upper arms.

It is advisable to change the site with every dose.

Having decided upon the site, rub gently with alcohol an area an inch in diameter. Pick up a fold of the skin between thumb and forefinger of the left hand and, with the syringe held at a 45-degree angle, push the needle quickly and firmly into the fold nearly up to the butt. Releasing the fold held with the left hand, steady the needle by its butt and inject the insulin slowly with the thumb of the right hand. Remove the needle quickly and rub the area of injection with the alcohol sponge.

4. **Cleaning up** Rinse the syringe and needle with cold water. Leave them dry in the box or return them to the alcohol, depending upon the method of sterilization.

A fine wire should always be kept in the needle.

URINE TEST FOR SUGAR

The Benedict qualitative test is commonly used. To make this test, place 4 drops of urine in a test tube, add 2½ cubic centimeters or ½ teaspoon of Benedict's solution, shake the tube well to mix urine and solution, and place in a water bath of bubbling boiling water for 5 minutes.

If sugar is present, the entire body of the solution will be filled with a precipitate which may be greenish, yellow, or red in color according to whether the amount of sugar is slight or considerable. If the solution remains clear, the urine being tested is sugar-free.

Daily urinalysis is advisable for all diabetic patients to insure better control of the disease.

ACIDOSIS-DIABETIC COMA

The term acidosis indicates a condition in which the blood and tissues are less alkaline than they should be. The normal body is always

very slightly basic. Any decrease in alkalinity, even though very small, is compatible with health; while the slightest degree of acidity causes death. The two most common and serious forms of acidosis are the acid-ash and the acetone types. The latter is that met with in diabetes.

Fats are composed of glycerol and fatty acids. When fat is burned in the body, both the glycerol and the fatty acids pass through various steps to form carbon dioxide and water. Fatty acids burn completely unless so little carbohydrate and protein is available that the caloric needs of the body must be supplied by a great excess of fat. When, as in diabetes, the body burns only a small amount of carbohydrate, the quantity of fat which must be utilized is correspondingly increased and the incomplete oxidation of fatty acids results in the accumulation of their intermediary combustion products, beta-oxybutyric and aceto-acetic acids and acetone. These are known as acetone or ketone bodies because the ketone, acetone, is readily formed from them. These acids decrease the alkalinity of the body, producing the acetone type of acidosis which is the end result of uncontrolled diabetes.

Definition Diabetic coma, or acid poisoning, occurs when the fat in the body or diet is imperfectly utilized, and fatty acids are formed, which poison the system and render the patient unconscious, causing death if treatment is neglected.

Prevention of diabetic coma Teach patients to follow these rules if they feel "sick."

1. Call a doctor and report urine test.
2. Never omit insulin unless urine is repeatedly sugar-free.
3. Go to bed.
4. Take a cup of hot liquid every hour, as hot water, tea, coffee, clear broth, or water-oatmeal gruel.
5. Keep warm in bed with blankets and bed socks.
6. Get a nurse or someone to give nursing care.
7. Move the bowels with an enema.
8. Do not omit insulin if sugar is present in urine.

Collect urine specimens every 3 hours and take regular insulin according to the results of the Benedict Test.

Red	Orange	Yellow	Green	Blue
20	15	10	5	0

If the patient is using protamine zinc insulin or combined doses of regular and protamine zinc insulin, take the usual morning dosage, and at 12 noon and 6 P.M. regular insulin according to the urine sugar.

Red or Orange	Yellow
16, 12 or 8	12 or 8

Test at bedtime and take regular insulin.

Red or Orange	Yellow
6	4

Diet for a day of illness Omit the usual diet and take the following when desired through the day:

		CARBO-HYDRATES	PROTEIN	FAT
Milk	960 c.c. (1 quart)	47	34	38
Cereal	15 grams dry (120 cooked)	10	3	1
Bread, white	90 grams	45	8	3
Orange juice	400 grams	52	2	0
Egg	1		6	6
Butter	15 grams			12
		154	53	60
		4	4	9
Total Calories		616	212	540

Cause of diabetic coma It is good to note that diabetic coma is usually preventable in that it follows (1) overeating, (2) infections and fever, (3) omission of insulin or too little insulin, and (4) occurs in untreated and undiagnosed cases.

Symptoms and signs The history of the illness is a great aid to the diagnosis of coma. The onset is gradual, with hours or days of malaise, generalized pain, extreme thirst, nausea and vomiting, loss of appetite, slow labored breathing, and air hunger (Kussmaul respirations), acetone breath. A coma patient presents a distressing picture. He may be unconscious or semiconscious, with dry skin, flushed drawn face, and obviously dehydrated tissues. The eyeballs are soft, the mouth and tongue dry, and the teeth present a dirty coating.

TREATMENT BY THE PHYSICIAN

1. Diagnosis—Urine sugar ++, Diacetic acid ++++, Blood sugar high, Carbon dioxide combining power of the blood plasma 20 volumes per cent or below.

2. Regular insulin—20 to 100 units repeated every 30 to 60 minutes until clinical and chemical improvement. It is the insulin given in the first 3 hours which counts most.

3. Fluids and salt—1000 to 1500 cubic centimeters of normal salt solution intravenously or subcutaneously, repeated once or more in the first few hours.

4. Gastric lavage.

5. Enemata.

6. Stimulant for the heart.

7. Carbohydrate 50 to 100 grams within the first 24 hours after the blood sugar approaches normal.

REPORT OF PATIENT MR. J. P. P. WITH DIABETIC COMA

Mr. J. P. P. was 33.2 years of age at the onset of his diabetes in June 1938. He was last seen in October 1938, having at that time a favorable report with an insulin dose of Regular Insulin 6 units and Protamine Zinc Insulin 20 units, and a diet of Carbohydrate 160 grams, Protein 85 grams, Fat 104 grams, Total Calories 1916.

On December 31, 1938, the patient was admitted to the hopital in diabetic coma. He probably neglected diet and insulin while in New York on a vacation trip of 3 days' duration. Nausea and vomiting had persisted for 2 days, and difficulty in breathing for 1 day. The patient, conscious though confused, was in a critical condition. He had the typical Kussmaul respirations and acetone breath (sweetish odor). The skin was dry and deeply flushed, lips dry and cracked, tongue dry, pharynx red, hands and feet cold. The eyeballs were questionably soft. Upon physical examination the temperature was 96.2° rectal, pulse 82 regular, blood pressure 124/64, lungs clear, and abdomen slightly distended.

The laboratory findings were: white blood count, 52,000, red blood count 4,730,000, hemoglobin 90 per cent. The urine showed ++ diacetic acid and an orange reaction to Benedict's Solution. The blood analyses, nonprotein nitrogen, sugar and carbon dioxide combining

power, are tabulated in Table I, which also shows treatment for the first 24 hours.[4]

Following recovery from coma, the patient was adjusted to a diet of Carbohydrate 165 grams, Protein 100 grams, Fat 120 grams, and discharged from the hospital January 11, 1939, with an insulin requirement of 48 units of regular insulin and 64 units of protamine zinc insulin.[5]

TREATMENT OF DIABETES

The treatment of diabetes consists of (1) an adequate diet, (2) insulin if indicated, and (3) exercise, combined with education of the patient in order to prevent the loss of sugar in the urine and to maintain a normal blood sugar, thus promoting good health, comfort, and longevity.

Planning the diabetic diet Diet is basic in the treatment of diabetes. Like the normal balanced diet, the diabetic diet should contain all of the minerals, vitamins, amino acids, and fiber essential for proper growth and development and for the prevention of deficiency diseases. Since one cannot say today that the caloric allowance for the diabetic patient is slightly below the caloric requirement in health, he should be given a diet which is adequate in food essentials for normal nutrition.

The diabetic diet for adults should contain 25 to 30 calories or more per kilogram of body weight. For children and adolescents up to 20 years of age, the following dietary prescriptions were employed by the writer at the suggestion of Dr. Priscilla White during the summer camp season in 1938.

AGE	CALORIES PER KILOGRAM
0—5	80
6—10	70
11—15	50
16—20	35

[4] Normal nonprotein nitrogen is from 25 to 40 milligrams per 100 c.c. of blood. Normal blood sugar is from 0.07 to 0.12 per cent fasting. Normal CO_2 is from 55 to 75 volumes per cent (coma diagnosis—20 or below).

[5] Recovery would have been still more rapid if the two one-hundred unit doses of insulin had been given earlier in place of the fifty units. The secret of success in the treatment of diabetic coma is to give insulin early.

TABLE I

Blood				Treatment			
				Insulin			
Time hour	NPN mgs.	B. S. %	CO_2 volumes %	Units given	Time given	Carb. gms.	Gastric Lavage—1500 cc. removed
10:35 A.M.	94	0.92	8	50	10:40 A.M.		1000 cc. Normal Saline I.V.
				30	11:25		1000 cc. Normal Saline I.V.
				50	12:00		
12:35 P.M.		0.86	8	50	12:30 P.M.		
				100	1:15		1000 cc. Normal Saline I.V.
3:00 P.M.	91	0.59	12	100	2:00		
				30	4:30		1000 cc. Normal Saline I.V.
				50	5:30		
				30	6:30		
				20	7:50		
8:00 P.M.	75	0.30	29	0	8:40		
				0	9:30		
				0	10:30	75	1500 cc. Normal Saline S.C.
				0	11:30		with 5 per cent glucose
				0	12:30		
				0	1:30 A.M.		
2:00 A.M.	74	0.19	35	0	2:30		
				0	3:30	50	1000 cc. Normal Saline I.V.
				0	4:30		with 5 per cent glucose
				0	5:30		
				0	6:30		1000 cc. Normal Saline I.V.
						66 (by mouth)	
				0	2:00 P.M.		
				Total		Total	Summary
				510		191	5000 cc. Normal Saline I.V. 1000 cc. Normal Saline I.V. with 5 per cent glucose 1500 cc. Normal Saline S.C. with 5 per cent glucose Gastric Lavage

The proportion of carbohydrate, protein, and fat is an individual study and differs from the normal diet in that the carbohydrate content is usually lower, with a corresponding increase in fat to supply the caloric allowance.

	CARBOHYDRATE (*grams*)	PROTEIN (*grams*)	FAT (*grams*)
Adults	100 to 200	1 to 1.5 per kg.	about ½ of total calories
Children	140 to 250	3 to 1.5 per kg.	50 to 100 grams or amount needed for maintenance of body weight.

A higher carbohydrate and moderately low fat diet is less expensive and more nearly like a normal diet than a high-fat, low-carbohydrate regime.

Diabetic diets commonly used in the George F. Baker Clinic by Dr. Joslin and his associates are outlined in Table II and can be computed from the food analyses in Table III. The diets listed in Table II may seem complicated, but in reality are very simple. The letter C represents the carbohydrate in the diet and the letters PF, the protein and fat. The numbers represent six consecutive diets. Thus Diet C_5 PF_3 is divided into three meals on a Discharge Direction form in gram weight and corresponding household portions.

APPROXIMATE EQUIVALENTS

1 egg =
- 15 grams cheese
- 15 grams bacon
- 30 grams meat, fish, or fowl
- 30 grams cottage cheese, plus 5 grams butter

Oats 15 grams (dry) =
- 120 grams *if* cooked in 4 times as much water
- 13 grams (dry) or 14 drams (cooked) of other hot cereals
- 12 grams dry cereals
- 15 grams bread

DISCHARGE DIRECTIONS

BREAKFAST			DINNER			SUPPER			TOTAL DAILY DIET	
CRYS. INSULIN——UNITS PROT. INSULIN——UNITS			CRYS. INSULIN——UNITS			CRYS. INSULIN——UNITS			C. P. F. CAL. 150 - 71 - 81 - 1613	
	GRAMS	PORTIONS		GRAMS	PORTIONS		GRAMS	PORTIONS		GRAMS
Eggs		1	Eggs	(small	serving)	Eggs			Eggs	1
Meat, cooked		or	Meat, cooked	60	2 oz.	Meat, cooked	60	2 oz.	Meat, cooked	120
Bacon	15	2 strips	Bacon			Bacon			Bacon	15
5% veg.			5% veg.	150	1 cup	5% veg.	150	1 cup	5% veg.	300
10% veg.			10% veg.	75	½ cup	10% veg.	75	½ cup	10% veg.	150
Oat., dry	(15)		Oat., dry			Oat., dry			Oat., dry	(15)
Oat., cooked	120	½ cup	Oat., cooked			Oat., cooked			Oat., cooked	120
Uneedas			Uneedas			Uneedas			Uneedas	10
Butter	5	1 teasp.	Butter	10	2 teasp.	Butter	10	2 teasp.	Butter	25
Cream, 20%	60	¼ cup	Cream, 20%	30	2 tbsp.	Cream, 20%	30	2 tbsp.	Cream, 20%	120
Milk	120	½ cup	Milk		Medium	Milk			Milk	240
Orange	100	Small	Orange	150		Orange	150	Medium	Orange	400
Cheese			Cheese			Cheese			Cheese	
Potato			Potato			Potato			Potato	
Bread	30	1 slice	Bread	30	1 slice	Bread	30	1 slice	Bread	90

Bedtime 2 Uneedas + 120 milk (½ cup)

APPROXIMATE EQUIVALENTS—Continued

Butter 10 grams =
8 grams oil
10 grams mayonnaise
30 grams 20% cream

Bread 15 grams =
2 Uneedas or
12 grams of any plain crackers

Meat 45 grams =
45 grams of any kind of meat or fowl
45 grams of fat fish or canned fish
60 grams of fat-free fish and 9 grams butter (extra)

Meat 60 grams =
60 grams of any kind of meat or fowl
60 grams of fat fish or canned fish
80 grams of fat-free fish and 12 grams butter (extra)

5% vegetable 150 grams =
75 grams 10% vegetable
1 Uneeda
30 grams potato

Potato 60 grams =
60 grams of any 20% vegetable
20 grams bread

Potato 90 grams =
90 grams of any 20% vegetable
30 grams bread

If potato baked, take 20 grams extra to allow for weight of potato skin.

TABLE II

DIABETIC DIETS

Diets	TOTAL DIET				CARBOHYDRATE (C)						PROTEIN AND FAT (PF)				
	Carbohydrate	Protein	Fat	Calories	5% Vegetables	Orange	Oatmeal	Potato	Bread	Milk	Egg	Meat	Bacon	20% Cream	Butter
C1 PF1	121	53	64	1272	300	400	15	90	45	240	1	75	.....	120	15
C2 PF2	136	60	71	1423	300	400	15	120	60	240	1	90	.....	120	20
C3 PF3	151	70	80	1604	300	400	15	150	75	240	1	120	.....	120	25
C4 PF4	165	82	97	1861	300	450	15	150	90	240	1	150	15	120	30
C5 PF5	180	89	103	2003	300	450	15	180	105	240	1	165	15	120	35
C6 PF6	199	99	123	2299	300	450	30	180	120	240	1	180	30	120	45
ACUTE ILLNESS	152	50	52	1276		400	15		90	960	1				15

Approximate equivalents. 1 small orange (100 grams) = ½ banana (50 grams) = ½ saucer oatmeal (15 grams dry or 120 grams cooked) = 2 large saucers (300 grams) 5% vegetables = 1 large saucer (150 grams) 10% vegetables = potato size of egg = ½ slice (15 grams) bread.

The carbohydrate foods include the articles listed under the heading Carbohydrate in line with C_5 and the protein and fat likewise under their heading opposite PF_3 (Table II). Orange and grapefruit are used as standards for fresh fruits. Other fruit substitutes for 150 grams of grapefruit at breakfast and 150 grams of orange at dinner and supper are listed in Table III.

TABLE III

FOODS ARRANGED APPROXIMATELY ACCORDING TO CONTENT OF CARBOHYDRATE—DR. E. P. JOSLIN[6]

WATER, CLEAR BROTHS, COFFEE, TEA, COCOA SHELLS, AND CRACKED COCOA CAN BE TAKEN WITHOUT ALLOWANCE FOR FOOD CONTENT

VEGETABLES, (FRESH OR CANNED)				
Reckon average carbohydrate in 5% vegetables as 3%; in 10% vegetables as 6%.				
5%		10%	15%	20%
1%-3%	3%-5%	10%	15%	20%
Lettuce	Tomatoes	String beans	Green peas	Potatoes
Cucumbers	Watercress	Brussels sprouts	Jerusalem artichokes	Shell beans
Spinach	Sea kale	Pumpkin	Parsnips	Baked beans
Asparagus	Cauliflower	Turnip	Lima beans, young	Lima beans
Rhubarb	Eggplant	Squash		Green corn
Endive	Cabbage	Okra		Boiled rice
Marrow	Radishes	Beets		Boiled macaroni
Sorrel	Leeks	Carrots		
Sauerkraut	String beans, young	Onions		
Beet greens	Broccoli	Green peas, very young		
Dandelions	French artichokes			
Swiss chard	Green peppers			
Celery	Summer squash			
Mushrooms	Kohlrabi			

[6] The above chart of Dr. Elliott P. Joslin's may be procured in quantity from Thomas Groom & Co., 105 State Street, Boston, Mass. (Form J-34-7-43.)

Approximate Carbohydrate Substitution Values

Food	Carbohydrate 10 Gm.	15 Gm.	Food	Carbohydrate 10 Gm.	15 Gm.
Grapefruit pulp	150	225	Plums	80	120
Strawberries	150	225	Pineapple	70	105
Watermelon	150	225	Apple	70	105
Cantaloupe	150	225	Honeydew melon	70	105
Blackberries	120	180	Blueberries	70	105
Orange pulp	100	150	Cherries	60	90
Pears	90	135	Banana	50	75
Peaches	90	135	Prunes (cooked)	50	75
Apricots	80	120	Ice cream	50	75
Raspberries	80	120			

1 gram carbohydrate, 4 calories.
1 " protein, 4 calories
1 " fat, 9 calories
6.25 " protein contain 1 g. nitrogen.

1 kilogram = 2.2 pounds.
30 grams (g.) or cubic centimeters (c.c.) = 1 ounce.
A patient "at rest" requires 25 calories per kilogram.

30 Grams 1 oz. Contain Approximately	Carbohydrate	Protein	Fat	Calories
	Gm.	Gm.	Gm.	
Vegetables, 5%	1	0.5	0	6
Vegetables, 10%	2	0.5	0	10
Potato	6	1	0	28
Bread	18	3	0	84
Uneeda biscuits, 2	10	1	1	53
Oatmeal, dry weight	20	5	2	118
Shredded wheat, 1	23	3	0	104
Milk	1.5	1	1	19
Meat, cooked, lean	0	8	5	77
Fish, fat-free	0	6	0	24
Chicken, cooked, lean	0	8	3	59
Egg, one	0	6	6	78
Cheese	0	8	11	131
Bacon	0	5	15	155
Cream, 20%	1	1	6	62
Cream, 40%	1	1	12	116
Butter	0	0	25	225
Oil	0	0	30	270

If the patient is averse to the use of food scales, a simpler basic diet is offered which can be modified to the patient's habits.

TABLE IV—EXAMPLE

FOOD	UNIT PORTION	GRAMS IN EACH PORTION				TOTAL DAILY PORTIONS	TOTAL GRAMS		
		WEIGHT	C	P	F		C	P	F
Bread	1 slice	30	18	3	...	3	54	9	...
Oatmeal	1 large	30, dry	20	5	2	1	20	5	2
Orange	1	150	15	...	...	3	45	...	...
Vegetables, 3-5%	1 cup	150	5	2½	...	4	20	10	...
Milk	¼ pint	120	6	4	4	1	6	4	4
Cream, 20%	¼ pint	120	4		24	1	4	4	24
Egg	1	60	...	6	6	1	...	6	6
Meat	1 small	60	...	16	10	2	...	32	20
Butter	1 square	10	...	...	8	3	...	...	25

Grand total grams (approximate)	C150	P70	F80
Calories	x4	x4	x9
Total Calories—1600 =	600	280	720

Treatment of new diabetic patients and of those requiring appreciable adjustment is more successfully carried out in the hospital than at home. The diabetic regime employed at the George F. Baker Clinic by Dr. Joslin and his associates is as follows:

1. Twenty-four-hour urine saved daily for volume, quantitative sugar, and diacetic acid. Specimens are collected at intervals, 6:00, 9:30, 11:30 A.M.; 2:30, 4:30, 7:30, 9:30 P.M., from which four drops are taken for qualitative sugar analysis to determine the effect of diet and insulin.
2. Admission height and daily fasting body weight.
3. Dietary prescription in gram weight, working toward a maintenance diet at discharge.
4. Insulin or protamine zinc insulin according to glycosuria and blood sugar.
5. A diabetic education acquired through class-room lectures by the doctors, individual instruction by the Teaching Diabetic Supervisor, the Surgical Diabetic Nurse, and by use of the Diabetic Manual.

At discharge, patients are advised to make minor adjustments in insulin dosage to control glycosuria or to avoid insulin reactions, rather than alter their diet.

TABLE V

HOSPITAL CHART OF PATIENT, MISS J.L.

ADJUSTMENT TO DIABETIC REGIME WITH PROTAMINE ZINC INSULIN

Ref. by Dr. | Usual Insulin Dose 0 | Present Age of Patient 22.2 | Net Height in Inches 63
Address | Usual Diet 0 | Date of Onset of D.M. November 1936 | Net Weight in Kilograms 50

Date 1936	Vol. c.c.	Diacetic Acid	SUGAR IN URINE: Reduction %	SUGAR IN URINE: Total G.	SPECIMENS: 6	930	1130	230	430	730	930	DIET IN GRAMS: Carbohydrate	Protein	Fat	Calories	Naked Weight Lbs.	BLOOD: Sugar %	INSULIN: Units Given	INSULIN: Time Given
Dec.													(1	me	al)				
30-31	1100	+ +	7.0	77	...	...	...	...	...	...	...	40	14	24	432	.....	....	16	....
Jan. 1937																			
31- 1	1800	+	5.0	90	...	R	R	R	Or	R	Or	152	65	69	1489	109¼	0.24 11:30 A.M.	20	7:45 A.M.
1- 2	1600	+ +	4.4	70	ST	Or	R	R	R	R	...	152	70	81	1617	109¾	....	30	7:30 A.M.
2- 3	1800	+	1.8	32	Y	Y	YG	R	Or	Or	Y	151	69	71	1519	112½	0.17 11 A.M. 0.21 4 P.M.	40	7:45 A.M.
3- 4	1900	+	4.4	84	SF	Or	R	R	R	R	R	161	76	87	1731	115	0.06 12 Noon 58	40 40	7:45 A.M. 7:45 A.M.
4- 5	1800	0	1.6	29	Or	SF	Y	R	R	Y	SF	161	76	87	1731	115	0.11 9:15 A.M.	10 10	11:30 A.M. 6:00 P.M.
5- 6	1800	0	1.3	23	SF	YG	Or	Y	Y	Or	Y	161	76	87	1731	115½	....	46	7:45 A.M.
9-10	2000	0	0	0	SF	SF	SF	SF	SF	SF	SF	162	74	87	1727	117	0.05	38	7:40 A.M.
10-11	1900	0	Tr	0	SF	SF	Tr	Tr	Tr	SF	SF	162	76	87	1727	117	....	34	7:30 A.M.
13-14	1800	0	0.2	4	SF	SF	SF	SF	G	YG	SF	162	76	87	1727	116½	0.08 Fasting	28	7:30 A.M.
												Dis	cha	rge	Diet			26	
14-15	....	....	....	...	SF	...	...	...	...	...	...	182	76	87	1815	116	....	...	....

Date	Sp. Gr.	Reac.	Alb.	Bile	Sugar	Diac.	Sediment	LABORATORY DATA
12-30-	1.044	ac.	.02	0	6.6	+ + +	OCC C G C, MANY RBC, NO PUS.	

HISTORY.—Rapid onset of Diabetes Mellitus with symptoms of loss of weight, hunger, thirst (counted 30 glasses of liquid in one day), frequency. There is no heredity or history of obesity.

NOTE.—Protamine Zinc Insulin is charted in the bracket and was supplemented with Regular Insulin only on one day, January 4, 1937.

Single specimens are recorded according to the color of the Qualitative Benedict Test: R = red; Or = orange Y = yellow; YG = yellow green; Tr = trace; ST = slight trace; SF = sugar free.

SUMMER CAMPS FOR THE JUVENILE AND ADOLESCENT DIABETIC

There are about 8000 diabetic children in the country today under 15 years of age. Since the life expectancy of the diabetic child has grown with improved treatment, their future is a challenge to all teachers of diabetic patients. A lessening number will succumb to diabetic coma, but an increasing number after 15 years of the disease will develop distressing complications in the blood vessels, eyes, and kidneys, particularly if their disease is uncontrolled.

The diabetic child must have a knowledge of his disease. Summer camps which provide for special supervision of diabetic children are becoming more and more popular as teaching centers.

During the summer of 1944, 150 of these children had the privilege of spending 2 weeks or more of their school vacation at various camps where treatment was directed by Dr. Priscilla White. Through direct contact with teaching nurses, dietitians, and technicians, these children learn how to live a normal life despite their handicap.

They are taught the fundamentals of diabetic treatment: (1) the Benedict test for sugar, (2) to administer their own insulin, (3) food values and how to trade a variety of foods, (4) special treatment for a sick day, (5) to recognize and treat symptoms of insulin reaction or diabetic coma, (6) hygiene.

From contact with each other, alike in their handicap, they learn the advantages of controlled diabetes and the disadvantages of poor control, and that the success of their future is dependent upon conscientious following of prescribed treatment. Other benefits derived from diabetic camps are a vacation for the parents, the opportunity offered for study of the more normal diabetic child and his demands for growth and happiness, the study and treatment of the retarded diabetic child who has failed to grow and develop properly, and of children with enlarged livers.

Examples of standard diets employed at the various summer camps in 1938 are listed in Table VI.

TABLE VI

STANDARD DIETS IN CHILDHOOD AND ADOLESCENCE

AGE YEARS	SEX	CARB. (*grams*)	PROT. (*grams*)	FAT (*grams*)	CALORIES
0—5	F—M	140	60	70	1430
6—9	F—M	160	70	80	1640
10—12	F—M	180	80	90	1850
13—17	F	200	100	100	2100
13—17	M	250	115	115	2495

Thus, the average diet for an adolescent girl is divided into 3 meals and 3 lunches on a Discharge Diet form.

BREAKFAST		MID. A.M.	DINNER		MID. P.M.	SUPPER		BED TIME	TOTAL DAILY DIET	
REG. INSULIN . . UNITS PROT. INSULIN . . UNITS			REG. INSULIN . . UNITS PROT. INSULIN . . UNITS			REG. INSULIN . . UNITS PROT. INSULIN . . UNITS		REG. I	C. 204 P. 99 F. 98 CAL. 2094	
	GRAMS	LUNCH		GRAMS	LUNCH		GRAMS	LUNCH		GRAMS
Eggs	1	....	Eggs	....	....	Eggs	....	....	Eggs	1
Meat, cooked	...	....	Meat, cooked	90	....	Meat, cooked	90	....	Meat, cooked	180
Bacon	15	....	Bacon	....	....	Bacon	....	....	Bacon	15
5% Veg.	...	....	5% Veg.	150	....	5% Veg.	150	....	5% Veg.	300
10% Veg.	...	....	10% Veg.	75	....	10% Veg.	75	....	10% Veg.	150
Oat., dry	15	....	Oat., dry	....	....	Oat., dry	....	....	Oat., dry	15
Oat., cooked	(120)	....	Oat., cooked	....	....	Oat., cooked	....	....	Oat., cooked	....
Uneedas	...	2	Uneedas	....	2	Uneedas	....	2	Uneedas	6
Butter	10	....	Butter	10	....	Butter	10	....	Butter	30
Cream, 20%	60	....	Cream, 20%	....	....	Cream, 20%	....	....	Cream, 20%	60
Milk	120	....	Milk	180	....	Milk	180	....	Milk	480
Orange	...	....	Orange	150	....	Orange	150	....	Orange	300
Grapefruit	150	....	Grapefruit	....	....	Grapefruit	....	....	Grapefruit	150
Cheese	...	....	Cheese	....	....	Cheese	....	....	Cheese	....
Potato	...	....	Potato	60	....	Potato	60	....	Potato	120
Bread	30	....	Bread	30	....	Bread	30	....	Bread	90

A school lunch is equivalent to the value of the dinner meal. The approximate value of the average diabetic child's dinner is C 65, P 35, F 32.

SCHOOL LUNCHES—SUBSTITUTE FOR DINNER[7]

APPROXIMATE VALUE OF AVERAGE DIABETIC CHILD'S DINNER
C 65, P 35, F 32.

1.

	CARBOHYDRATES (*grams*)	PROTEIN (*grams*)	FAT (*grams*)
Bread, 60 grams	36	6	0
Meat, 60 grams	0	16	10
Lettuce			
Butter, 15 grams	0	0	13
Cottage cheese, 25 grams	0	5	0
Milk, ½ pint (240 grams)	12	8	8
Orange, 150 grams	15	0	0
	63	35	31

2.

Bread, 60 grams	36	6	0
Cheese, 45 grams	0	12	16
Lettuce			
Egg, 1	0	6	6
Milk, ½ pint (240 grams)	12	8	8
Apple, 100 grams	15	0	0
	63	32	30

3.

Bread, 60 grams	36	6	0
Choice of filling, 75 grams:			
Crabmeat, tuna or salmon	0	20	13
Lettuce			
Mayonnaise			
Butter, 15 grams	0	0	13
Milk, ½ pint (240 grams)	12	8	8
Banana, 75 grams	15	0	0
	63	34	34

[7] Joslin, *op. cit.*

SCHOOL LUNCHES—SUBSTITUTE FOR DINNER—Continued

4.

Bread, 40 grams	24	4	0
Meat, 45 grams	0	12	8
Egg, 1 (hard boiled)	0	6	6
Butter, 15 grams	0	0	13
Milk, ½ pint (240 grams)	12	8	8
Raw carrot, 75 grams	5	2	0
Tomato, 150 grams	5	3	0
Peach, 115 grams	15	0	0
	—	—	—
	61	35	35

SCHOOL LUNCH FOR PART OF DINNER

	CARBOHYDRATES (*grams*)	PROTEIN (*grams*)	FAT (*grams*)
At school, 11 A.M.			
Milk, ½ pint (240 grams)	12	8	8
Bread, 50 grams	18	3	0
Lettuce			
Butter, 5 grams	0	0	4
Orange, 150 grams	15	0	0
	—	—	—
	45	11	12
At home, 2:30 P.M.			
Meat, 75 grams	0	20	13
5% vegetables, 150 grams	5	3	0
Potato, 90 grams	18	3	0
Butter, 10 grams	0	0	8
	—	—	—
	23	26	21

DIETETIC SUGGESTIONS, RECIPES, AND MENUS

"The modern diabetic has little need for special foods and recipes because the diabetic diet today is sufficiently varied and liberal to be both palatable and satisfying. Plain foods well cooked are enjoyed the most, and the taste for them grows rather than wanes. It is both less conspicuous and less troublesome to select food from the diet served the rest of the family than to have specially prepared foods. The less a diabetic alters the essentials of the standard diet the easier it is for him in the long run to adhere to it." [8]

Long lists of special diabetic recipes are no longer either necessary

[8] Joslin, *op. cit.*

or advisable, and those now included in this chapter are sufficient to meet the demands of the modern diabetic patient.

The standard diet includes:

1. All kinds of vegetables which are classified as to carbohydrate content as 5, 10, 15, and 20 per cent or as 3, 6, 9, 12, 15, and 18[9] per cent, canned or fresh. Five per cent vegetables furnish the bulk of the diet and are of especial value for their vitamin content.
2. A choice of fresh fruit for dessert or canned fruit of the water-packed brands.
3. Milk in sufficient quantity to supply calcium. Buttermilk or evaporated milk are used as substitutes.
4. Eggs prepared in any way, bacon, or cheese.
5. A choice of meat, fish, or fowl. Liver and bacon and shellfish offer variety.
6. A variety of breads, white or whole-grain.
7. Any kind of cooked or dry cereals.
8. Butter, cream, oil, or mayonnaise.
9. Commercial ice cream once or twice a week substituted for fruit.

Foods may be seasoned according to taste, provided no sugar is used. Condiments such as mint, capers, curry, vinegar, tarragon vinegar, bay leaf, cloves, ginger, nutmeg, cinnamon, mustard, paprika, anise seed, caraway seed, celery salts, onion extract, and horseradish are allowed. Sour pickles and other pickles made from the 5 per cent group of vegetables may be used provided they are prepared without sugar.

Saccharin is a substitute for sugar but since its use is a constant reminder of the sweet taste which the diabetic wishes to forget, the modern diabetic is taught to avoid it.

Vanilla, orange, and lemon flavoring are permissible.

Cracked cocoa (cocoa nibs) makes a most useful drink for diabetic patients. This is not generally appreciated by the profession.

A sample of cracked cocoa (cocoa nibs) was purchased from a reliable Boston firm. It was analyzed by Professor Street, with the following result:

Moisture	2.83
Protein	14.69
Fat	51.42

[9] See Table 7, page 675.

Fiber	4.32
Ash	3.88
Starch	7.48
Reducing sugar, as dextrose direct	None
Reducing sugar, as dextrose after inversio	0.94

The cocoa is prepared for the table by adding 1 cupful of the cracked cocoa to 1 quart of water and letting it simmer on the back of the stove all day, adding water from time to time. The strained infusion alone should be taken and not the nutritious grounds or nibs. Professor Street was good enough to analyze the infusion, and wrote. "The cocoa prepared according to directions contained 0.138 per cent of total reducing sugars."

Cocoa shells are extensively used as a beverage. One cup of cocoa shells to 1 quart of water should be used. Allow to simmer at least one-half hour. Drink the strained infusion. Cocoa shells are far cheaper than cocoa nibs.

Broths are so extensively used for diabetic patients that their composition deserves notice. Jellylike broth contains a large quantity of protein in the form of gelatin, and such broths may prevent diabetic patients from rapidly becoming sugar free when they are consumed freely, because 58 per cent of the protein may break down into sugar.

As a rule, the nutritive value of a broth made for diabetic patients is or can be negligible. That this may be the case, the broth should be skimmed free of fat and obviously should be clear so as to be free from particles of meat fiber. Various canned bouillons and bouillon cubes contain very little nourishment. A danger in broths lies in the amount of salt which they contain.[10]

The approximate value of cream soups is 10 per cent carbohydrate.

The following lunches are suggestions for variety in a Standard Diet.

JOSLIN'S DIABETIC LUNCHEON MENUS [11]

I.

	CARBOHYDRATES (*grams*)	PROTEIN (*grams*)	FAT (*grams*)
Lamb chops, 2	0	16	10
Lettuce and tomato salad	5	3	0
Small potato	12	2	0

[10] Joslin, *op. cit.*
[11] *Ibid.*

	CARBOHYDRATES (*grams*)	PROTEIN (*grams*)	FAT (*grams*)
Bread, 1 slice	18	3	0
Butter, 1 portion	0	0	8
Milk, ½ pint	12	8	8
Orange	15	0	0
	—	—	—
	62	32	26

2.

Clear soup	0	0	0
Steak, medium	0	24	15
Tomato and cucumber salad	5	3	0
Peas, 1 saucerful	10	3	0
Baked potato, 1 medium	18	3	0
Butter, 1½ pats	0	0	13
Ice cream, 1 big scoop	20	0	0
Saltines, 3	10	1	1
	—	—	—
	63	34	29

3.

Milk, ½ pint	12	8	8
Uneedas, 5	25	3	3
Eggs, 2 scrambled	0	12	12
Toast, 1 slice	18	3	0
Butter, 1 pat	0	0	8
Orange, 1	10	0	0
	—	—	—
	65	26	31

4.

Club Sandwich			
Lettuce, tomato and cucumber	5	3	0
Bacon, 2½ strips	0	3	8
Chicken	0	16	6
Butter, 2 pats	0	0	16
Toast, 2 slices	36	6	0
Melon, ½	20	0	0
	—	—	—
	61	28	30

JOSLIN'S DIABETIC LUNCHEON MENUS—Continued

5.

	CARBOHYDRATES (*grams*)	PROTEIN (*grams*)	FAT (*grams*)
Oyster Stew			
Milk, ½ pint	12	8	8
Oysters, 9	6	9	2
Butter, 1 pat	0	0	8
Oyster crackers, 12	15	1	1
Cheese, 1 ounce	0	8	11
Toast, 1 slice	18	3	0
Banana, ½	10	0	0
	61	29	30

6.

Lobster	0	20	13
Lettuce and tomato salad	5	3	0
French fried potatoes	18	3	0
Butter, 1½ pats	0	0	13
Bread, 1 slice	18	3	0
Berries	20	0	0
	61	29	26

The dietary treatment of the diabetic patient with gastric or duodenal ulcer, tuberculosis, infections, and surgical complications is essentially the same as with the nondiabetic.

Special diabetic recipes are offered for variety and to aid in the planning of special diets for such patients and for the pregnant and lactating diabetic mother who may not like to drink milk.

The diet for acute illness (Table II, page 270) may also include these special desserts:

CUSTARD NO. 1

1 egg	120 cc. milk *or* water
60 c.c. cream	Flavoring, saccharin, nutmeg if desired

Beat the egg thoroughly, add the cream, milk, etc. Bake as 2 custards in a pan of water. Any combination of milk and cream if figured correctly may be used.

Each custard with milk—Calories, 265: carbohydrate, 9 grams; protein, 12 grams; fat, 20 grams.

Each custard with water—Calories, 180: carbohydrates, 3 grams; protein, 8 grams; fat, 15 grams.

CUSTARD NO. 11

2 cups milk 3 eggs ¾ grain saccharin

Beat the eggs, dissolve the saccharin in the milk, add to the egg. Pour the mixture into the mold. Place in a pan of lukewarm water and bake in a moderate oven. When a silver knife plunged into the center of the custard comes out clean, remove from the oven. This will fill 4 custard cups.

Calories, 550: carbohydrate, 24 grams; protein, 30 grams; fat, 34 grams.

4-oz. mold—Calories, 140. 1-oz. mold—Calories, 35.

LEMON JELLY

1 tbsp. granulated gelatin
¼ cup cold water
1 grain saccharin
½ cup lemon juice
3 cups boiling water

Soak the gelatin in cold water, add boiling water, lemon juice and saccharin. Stir until the gelatin is thoroughly dissolved. Pour into small molds and let stand in a cold place until firm.

Calories, 80: carbohydrate, 11 grams; protein, 9 grams; fat, 0.

MOUSSE

May be made with strawberries or peaches.

150 c.c. cream, 30%
110 grams peaches *or*
165 grams strawberries
1 or 2 egg whites
1 tsp. gelatin
Saccharin to taste

Dissolve the gelatin in 1 teaspoon of cold water. Heat 2 tablespoons of cream and add to gelatin and water. Place in pan of water. Whip the rest of the cream and saccharin together. Whip 2 egg whites. Add gelatin mixture to whipped cream and then add egg whites. Put the mixture in a mold and place in ice chest for 1 hour.

Calories, 525: carbohydrate, 16 grams; protein, 14 grams; fat, 45 grams.

SNOW PUDDING

1 tsp. lemon juice
1 tsp. gelatin
2 grains saccharin
½ cup boiling water
1 egg white, beaten stiff

Dissolve the gelatin in a half cup of boiling water, add lemon juice and saccharin. When partly jellied, add beaten egg white. Beat thoroughly and cool.

Calories, 16: carbohydrate, 1 gram; protein, 3 grams; fat, 0.

CUSTARD SAUCE (FOR ANY DESSERTS)

30 c.c. cream or milk	2 tbsp. water
½ egg yolk	Saccharin to taste

Calories, with milk, 55: carbohydrate, 2 grams; protein, 3 grams; fat, 4 grams.

Calories, with cream, 85: carbohydrate, 1 gram; protein, 2 grams; fat, 8 grams.

BAVARIAN CREAM

To any of the extracts suggested, when just beginning to jelly, beat in whipped cream allowed in diet.

WHIPS

To any jellies, when partially set, beat in whipped white of egg. Cocoa and coffee together make a mocha whip.

COFFEE SPANISH CREAM

Dissolve ½ teaspoon of gelatin in 5 tablespoons of coffee. Pour this on the beaten yolk of an egg. Add 60 c.c. of cream and 60 c.c. of milk, saccharin. Prepare as a soft custard and when thick add to the beaten white of egg. Chill and mold on ice. This makes two creams.

Vary with other flavors. Dissolve gelatin in hot water.

Calories for 1 serving, 110: carbohydrate, 3 grams; protein, 5 grams; fat, 9 grams.

When it is desirable to employ detailed food values in arranging a special diet, Table I in the Appendix will be useful.

QUESTIONS FOR STUDY

1. What organ of the body is at fault in diabetes?
2. What predisposes a person to diabetes?
3. What are the common symptoms?
4. Why is insulin given in the treatment of diabetes?
5. What are the chief differences in regular and protamine insulin?
6. How is insulin measured using a 1 c.c. syringe divided into tenths?
7. What causes an insulin reaction?
8. What are the usual symptoms of a reaction due to regular insulin? Protamine insulin?
9. What is the treatment of an insulin reaction?
10. How can a reaction be avoided?
11. What is the procedure for sterilizing insulin syringe and needles?

12. How is the urine examined for sugar?
13. What causes diabetic coma?
14. (*a*) What are the seven rules for prevention of diabetic coma? (*b*) What are the insulin rules suggested for prevention of diabetic coma? (*c*) What is the diet for a day of illness?
15. List the treatment for diabetic coma.
16. How does a diabetic diet differ from a normal diet?
17. Plan a diabetic diet from the Basic Diabetic Diet (Table IV) to include bread, cereal, grapefruit, orange, banana, 5 per cent vegetables potato, milk, cream, egg, bacon, meat and butter.
18. What constitutes a diabetic education?

14.
OTHER METABOLIC DISORDERS

Evidence now at hand supports the belief that endocrine function and nutritional status are closely related. Many aspects of endocrine activity indicate an appropriate balance in the nutritional requirements of many of the nutrients. Many aspects of endocrine dysfunction may be accounted for on the basis of some one or more dietary deficiencies. Thus the use of a well-balanced, adequate diet is most important in the corrective treatment of endocrine disorders.

GOITER

Thyroxine, the active principle of the thyroid gland, contains iodine as its primary constituent. When there is a deficiency of iodine in the diet for any length of time, the thyroid hypertrophies. This is a direct effort on the part of the gland to meet the requirements made upon it in spite of the deficiency in the needed supply of iodine. Thus the term "hyperthyroidism."

Simple goiter This condition [1] is endemic in regions where the soil is low in iodine content. It begins about the age of puberty and is more common among females than males. The disease is treated by administration of iodine in the form of its salts. Such treatment should be carried out only as directed by a physician, since the dosage must be carefully regulated.

Exophthalmic or toxic goiter This type of the disease is characterized by a high metabolic rate. In order to avoid utilization of his own tissues as a source of energy, the patient must be given amounts of food considerably in excess of his normal requirements. The actual amount to be given is related to his basal metabolism as per cent of the normal rate.

It is important to maintain nitrogen equilibrium, and the diet should

[1] See page 32.

contain an abundance of protein foods. Because of the disturbance in carbohydrate metabolism, patients should be fed frequently and given diets high in carbohydrate. The diet should be fully adequate with plenty of those foods rich in vitamins and minerals.

ADDISON'S DISEASE [2]

This disease, fortunately rare, is the result of the destruction or impairment of the adrenal cortex, either by tuberculosis or by atrophy from some cause not yet understood. The symptoms are general weakness, low blood pressure, a secondary anemia, digestive disturbances, nausea, and diarrhea. The disease is also marked by a bronze discoloration of the skin. The blood shows a low content of sodium and a high content of potassium. The prognosis is serious; and formerly most cases proved fatal. Now the use of the extract of adrenal cortex has provided an effective means for treatment of Addison's Disease.

Dietary treatment The best results demand: (1) Administration of active extracts of suprarenal cortex, together with sodium chloride and sodium citrate or bicarbonate. (2) The diet must be fully adequate in calories, proteins, and minerals. (3) Restriction of the intake of potassium may be of benefit. With the newer form of treatment, however, this step seems not to be necessary.

If the potassium is limited, only highly refined breads, cereals, and sugars are used; milk, meat, fruits, vegetables, and condiments are used moderately; vegetables and meats are prepared by a special method which reduces the potassium content so they may safely be used.

SUGGESTED DAY'S MENU FOR A LOW-POTASSIUM DIET

Breakfast:	GRAMS	APPROXIMATE MEASURE
Fruit from group III, preferably raw	100	1 average-sized serving
Cereal from group I	15	1 average-sized serving
Egg	50	1
Bacon	10	2 small strips
Bread, white (may be toasted)	30	1 slice
Butter	10	1 square
Cream	100	½ cup, scant

[2] Condensed from Sister Mary Victor, "A Diet Restricted in Potassium," in *Journal of the American Dietetic Association,* Vol. 14, No. 10, page 759.

SUGGESTED DAY'S MENU FOR A LOW-POTASSIUM DIET—Cont.

Dinner:		
Meat, specially cooked	75	1 fairly large serving
Potato, specially cooked	100	1 serving (½ cup)
Vegetable from group I	100	1 serving (½ cup)
Bread, white	30	1 slice
Butter	20	2 squares
Fruit from group II	100	1 serving (½ cup)
Cream	30	2 tbsp.
Milk	220	1 glass
Supper:		
Egg	50	1
Rice (weighed dry)	25	1 serving (½ cup)
Vegetable from group IV, preferably raw	100	1 serving
Mayonnaise	14	1 tbsp.
Bread, white	30	1 slice
Butter	20	2 squares
Fruit from group II	100	1 serving (½ cup)
Cream	30	2 tbsp.
Cheese	20	1 cubic inch
Milk	100	½ glass

Preparation of vegetables and meats Vegetables are cut into small pieces and cooked in 6 to 8 times as much water as is ordinarily used. This method reduces the potassium content from 60 to 70 per cent without destroying the palatability in proportion.

Meat is also cut fine and cooked in a parchment paper bag, using 6 to 8 parts water to 1 part meat. The potassium content is thus reduced 75 per cent, while retaining other nutrients and flavor-giving extractives.

CLASSIFICATION OF CEREALS ACCORDING TO POTASSIUM CONTENT EXPRESSED IN GRAMS PER 100 GM.

GROUP I RANGE, 0.05-0.015; AVERAGE, 0.1	GROUP II RANGE, 0.2-0.4; AVERAGE, 0.3
Corn flakes	Corn meal
Cream of wheat	Grapenuts
Farina	Oatmeal
Puffed wheat	
Rice, polished	
Puffed rice	
Rice krispies	

CLASSIFICATION OF VEGETABLES ACCORDING TO POTASSIUM CONTENT EXPRESSED IN GRAMS PER 100 GM.

<table>
<tr><th>GROUP I
RANGE,
0.05-0.10;
AVERAGE,
0.075</th><th>GROUP II
RANGE,
0.1-0.15;
AVERAGE,
0.125</th><th>GROUP III
RANGE,
0.15-0.25;
AVERAGE, 0.2</th><th>GROUP IV
RANGE,
0.25-0.35;
AVERAGE, 0.3</th><th>GROUP V
RANGE,
0.35-0.45;
AVERAGE, 0.4</th><th>GROUP VI
RANGE,
0.45-0.55;
AVERAGE, 0.5</th></tr>
<tr><td colspan="6">Fresh *</td></tr>
<tr><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2">Artichoke
Asparagus
Corn
Cucumbers
Eggplant
Hominy
Leeks
Onions
Onions, spring
Peppers, green
Radish
Squash, summer</td><td rowspan="2">Cabbage
Cabbage, red
Carrots
Cauliflower
Celery
Chard, Swiss
Lettuce
Peas
Pumpkin
Romaine
Rutabaga
Squash, Hubbard</td><td>Beets
Brussels sprouts
Endive
Kohlrabi
Mush-rooms
Parsnips
Potatoes, sweet</td><td>Dandelion greens
Potatoes
Spinach</td></tr>
<tr><td>String beans
Tomato
Turnips</td><td>Turnip tops
Water-cress</td></tr>
<tr><td colspan="6">Specially cooked †</td></tr>
<tr><td>Asparagus
Carrots
Corn (in parch-ment paper)
Onions
Pumpkin
Rutabaga
Squash, Hubbard
Turnips</td><td>Cabbage
Cauli-flower
Kohlrabi
Parsnips
Peas
Potatoes
String beans
Tomatoes (in parch-ment paper)</td><td>Beets (in parch-ment paper)
Brussels sprouts
Spinach</td><td colspan="3">† Values given for specially cooked vegetables were obtained by analysis, after cooking. When cooked in a large volume of water, the reduction of potassium averages 70 per cent in the case of carrots, kohlrabi, onions, turnips, parsnips, potatoes, rutabagas, squash, pumpkin, and spinach; 60 per cent in the case of cauliflower, cabbage, peas, asparagus, string beans, and Brussels sprouts. Corn, beets and tomatoes must be cooked in parchment paper because otherwise they would lose their color or become badly disintegrated. The reduction of potassium in these three vegetables averages 50 per cent.</td></tr>
<tr><td colspan="6">Canned</td></tr>
<tr><td>String beans
Wax beans</td><td>Peas</td><td>Asparagus
Corn
Spinach
Tomatoes</td><td></td><td></td><td></td></tr>
</table>

* Fresh vegetables may be consumed raw or cooked in any way desired.

CLASSIFICATION OF FRUITS ACCORDING TO POTASSIUM CONTENT EXPRESSED IN GRAMS PER 100 GM.

GROUP I RANGE, 0.05-0.1; AVERAGE, 0.075	GROUP II RANGE, 0.1-0.15; AVERAGE, 0.125	GROUP III RANGE, 0.15-0.25; AVERAGE, 0.2	GROUP IV RANGE, 0.25-0.35; AVERAGE, 0.3	GROUP V RANGE, 0.35-0.45; AVERAGE, 0.4
		Fresh *		
Blueberries Cranberries Huckleberries Pomegranates Watermelon	Apples Lemons Lemon juice Pears Strawberries Tangerines	Blackberries Cherries Gooseberries Grapefruit Grapes, black Oranges Orange juice Peaches Plums, red Quinces Raspberries	Apricots Cantaloupe Currants, red Currants, white Figs, green Loganberries Mulberries Nectarines Persimmons Pineapple Plums, green gage	Avocados Bananas Currants, black Limes Rhubarb
		Canned		
Pears	Peaches Pineapple Raspberries	Apricots Grapefruit		

* Fresh fruit may be consumed raw or cooked in any way desired.

AVERAGE POTASSIUM CONTENT OF FOODS EXPRESSED IN GRAMS PER 100 GM.[1]

FOOD	POTASSIUM CONTENT
Beverages:	
Apple cider	.095
Beer	.072
Champagne	.114
Coca-Cola	0
Coffee, beverage	.110
Coffee, roasted bean	1.651
Ginger ale	0
Grape juice	.106
Kaffee Hag, roasted bean	1.647
Postum	3.238
Red wines	.075
Sweet wines	.134
Beverages (continued):	
Malaga	.165
Sherry	.186
Bordeaux	.083
Tea, beverage	.030
Tea, dried leaves	1.689
White wines	.056
Bread and cereal products:	
Bread, white	.109
Bread, whole-wheat	(.45)
Bread, rye	.151
Corn flakes	.132

[1] Compiled from various sauces.

FOOD	POTASSIUM CONTENT
Bread and cereal products (cont'd):	
Corn meal, dry	.213
Cream of wheat, dry	.106
Farina, dry	.120
Flour, white	.130
Grapenuts	.342
Macaroni, dry	.174
Oatmeal, dry	.431
Puffed wheat	.117
Rice, polished, dry	.079
Rice, brown, dry	.561
Tapioca, dry	.020
Wheat bran	1.217
Concentrated sweets:	
Candy, sugar	.004
Corn syrup, white (Karo)	0
Jelly made with fruit juice	.126
Maple syrup	.242
Molasses	1.238
Sugar, white	.004
Sugar, brown	.265
Condiments, etc.:	
Citron, preserved	.017
Coconut, dried	.693
Horse-radish	.445
Mustard	.761
Olives	.809
Paprika	2.075
Pepper, black	1.140
Vinegar, cider	.150
Dairy products:	
Cheese (all kinds)	.131
Cream	.13
Eggs	.138
Yolk	.118
White	.154
Ice cream, commercial	.169
Milk, butter	.151
Milk, whole	.143
Fats:	
Bacon fat	0
Butter	.014
Margarine	.048
Fats (continued):	
Mayonnaise	.007
Pork fat	.175
Meats and fish:	
Anchovy	.152
Bacon, raw	.239
Beef, corned	.117
Caviar	.422
Clams	.172
Cod, dried and salted	.339
Crab, canned	.260
Fish, raw (all kinds)	.339
Lobster, canned	.258
Meat extracts	4.160
Meat, raw (all kinds)	.372
Oysters	.204
Salmon, canned	.316
Sardines, canned in oil	.433
Shrimp, canned	.404
Miscellaneous:	
Agar	.127
Baking powders, tartrate	9-12
Baking powders, phosphate	0
Cocoa	.900
Cream of tartar	20.720
Gelatin	0
Yeast, brewers', dried	2.055
Nuts (all kinds)	*
Vegetables and fruits:	
Vegetables in group I	.075
Vegetables in group II	.125
Vegetables in group III	.200
Vegetables in group IV	.300
Vegetables in group V	.400
Vegetables in group VI	.500
Fruits in group I	.075
Fruits in group II	.125
Fruits in group III	.200
Fruits in group IV	.300
Fruits in group V	.400
Fruits, dried (all kinds)	.888
Dried beans	1.201
Potato chips	.918

* Doubtless present but quantitative data have not been found.

QUESTIONS FOR STUDY

GOITER

1. What are the two types of goiter?
2. Describe the treatment of simple goiter.
3. Name some foods rich in iodine.
4. What effect has exophthalmic goiter on basal metabolism?
5. How does this affect the food requirement?
6. What type of diet should be used in exophthalmic goiter?
7. From what foods may the protein supply of the diet be derived?

ADDISON'S DISEASE

1. What is Addison's disease? What are its symptoms?
2. What mineral is restricted in the dietary treatment?
3. How are meats and vegetables prepared for this diet?

15.
ANEMIA

Anemia may be described as the condition in the circulating blood in which there is a reduction in the amount of hemoglobin, or in the size or number of red cells. The following grouping is given by McLester.[1]

CLASSIFICATION OF THE ANEMIAS

(Abbreviated from Castle and Minot)

A. Anemias due mainly to blood loss or increased blood destruction (bone marrow physiologically hyperactive)

B. Anemias due mainly to decreased blood production (bone marrow physiologically hypoactive).

- I. Nutritional deficiency of blood-forming organs
    - a. Macrocytic anemias (of which pernicious anemia is an outstanding example)
    - b. Hypochromic anemias due to deficiency of iron and other substances concerned especially with hemoglobin production (in which are included the so-called secondary anemias)
- II. Toxic inhibition of the blood-forming organs
- III. Physical injury of the blood-forming organs

This classification places the anemias in two main groups: (1) those caused by loss of blood through hemorrhage or destruction of blood and (2) those due to failure in function of the substance or substances essential to the formation of hemoglobin or of red cells.

Anemias due to loss of blood The reduced blood volume following loss of blood by hemorrhage is restored to normal fairly soon by absorption of fluid from the tissues, thus giving blood containing less than

[1] J. S. McLester, *Nutrition and Diet in Health and Disease*, 4th ed., Philadelphia: W. B. Saunders Co., 1944.

normal concentration of hemoglobin and of red cells. During the further restorative process, new red cells are formed more rapidly than hemoglobin; and, since the reserves of pigment substances are soon exhausted, the red cells contain less than the normal amount of hemoglobin. Such blood has a low color index.

Recovery in cases of anemia arising from loss of blood depends, then, on the formation of hemoglobin. With a fully adequate diet, iron seems to be effective, the ferrous salt being better utilized than the ferric.

Anemias due to deficiency in function of blood-forming substances In this group of anemias only two need be discussed from the standpoint of the subject matter of this book. These are the *hypochromic* and the *macrocytic* types.

The anemias of the hypochromic group are characterized by a deficiency of iron or of substances primarily concerned with hemoglobin formation. They are sometimes referred to as "secondary anemias." They tend to occur at the time of life when the physiological requirement for iron is greatest, although some authorities believe that the deficiency of the hemoglobin-forming substance is the primary factor involved. As outlined by McLester [2] from the work of Heath and Patek, such anemias are most likely to occur: (1) in childhood in both sexes; (2) in adults, more commonly in females than in males; (3) at the time of puberty, more commonly in males than in females; (4) during pregnancy; and (5) in females late in menstrual life or at the time of the menopause.

The iron deficiency of hypochromic anemia, characterized by a greater decrease in hemoglobin than in number of red cells, may come about from loss of hemoglobin during hemorrhage or pregnancy, from an insufficient intake of iron, or from defective utilization of that ingested. In such anemias the symptoms are pallor, weakness, easy exhaustion, nervousness, cardiac palpitation, constipation, and digestive disorders.

Hypochromic anemia is recognized through a reduction in the number and size of the red cells as well as in hemoglobin content. The blood has a color index less than 1, and the hemoglobin may be reduced as low as 20 per cent. The individual cell volume is usually low; and, except in the presence of jaundice caused by biliary tract disease, the icteric index is low or normal.

The anemias of the macrocytic group include pernicious anemia as

[2] *Op. cit.*

the best-known member. In this form of anemia there is a decrease in number of red cells formed rather than a reduction in size or in hemoglobin content of the cell. For this reason the blood of the pernicious anemia patient may show a color index greater than 1. The cell volume is also greater than the normal average cell volume, and the icteric index is higher than normal.

Characteristic symptoms include soreness or inflammation of the tongue or other mucous membranes of the mouth, involvement of the central nervous system with resulting numbness and tingling of the hands and feet, tightness or coldness of feet and legs or hands, hyperesthesia, and difficulty of locomotion.

The most pronounced finding in regard to pernicious anemia is the failure of secretion by the gastric mucosa of a substance (intrinsic factor) which in the normal individual reacts with a substance (extrinsic factor) from certain foods to produce a substance essential to the formation of red cells. This substance, called the antipernicious anemia factor, is stored in the liver. Pernicious anemia may result if either the extrinsic or the intrinsic factor is lacking, or in the presence of sufficient liver damage to hinder proper storage of the antipernicious anemia substance.

Achlorhydria, or absence of free hydrochloric acid from the gastric secretions, is also a typical feature.

TREATMENT OF ANEMIA

The course of treatment to be accorded the anemic patient will depend, obviously, upon the type of anemia present and the etiologic factors responsible, and accordingly varies considerably for the many forms of anemia now recognized. In the discussion given here it is possible to deal only with the more fundamental aspects of treatment for the more commonly observed forms of anemia.

Hypochromic anemia In the treatment of this type of anemia, attention must be given to the elements concerned in hemoglobin formation. These include (1) a supply of amino acids or protein for tissue building, (2) a supply of iron, and (3) a supply of certain other unidentified substances present in foods that have been demonstrated to be of value in promoting blood regeneration.

The protein supply should be taken care of through an adequate diet.

Of the three items listed, the supply of iron is of first importance. The

daily requirement for iron of the normal adult man weighing 70 kilograms is given as 0.012 grams, with a somewhat higher allowance for women, especially during pregnancy and lactation. Children need more in proportion to their weight than adults to meet the demands of growth.

The quantity of iron supplied by food, even in a well-chosen diet, is seldom sufficient to meet the requirements of the anemia patient; and it is customary to supplement this through administration of iron salt. Those most commonly used are ferrous sulfate, iron ammonium citrate, and ferrous carbonate (Bland's pill). Opinion differs as to the amount of iron that should be given. For practical purposes it is reasonably safe to assume that 3 grams (45 grains) of any of the 3 salts given above will be adequate. At times, however, such doses are entirely inadequate and 2 or 3 times as much must be given.

Experiments with animals have demonstrated the importance of the presence of minute amounts of copper for iron utilization in hemoglobin building. There is no clinical evidence that copper is of benefit in the treatment of anemias of adults; and, since many foods and especially vegetables contain small but significant amounts, it seems unnecessary to include this element as an essential item to be supplied.

The best source of the substance or substances in foods operative in blood regeneration is liver. This may be taken either cooked or as the raw pulp. Ingestion of whole liver or intramuscular injections of liver extract designed for the treatment of pernicious anemia in combination with peroral administration of iron salts are distinctly more beneficial than iron therapy alone. Liver extracts and their substitutes for peroral use, administered either alone or in combination with iron, are not of value in the treatment of hypochromic anemia. The use of commercial preparations comprising combinations of liver extracts, vitamins, and other substances with iron is to be discouraged, as the content of each and all of the effective constituents in these products is too small in proportion to their high cost.

Those anemias caused primarily by a deficiency of a vitamin or glandular secretion must receive specific replacement therapy in addition to iron. Vitamin C will be indicated in the anemia associated with scurvy; vitamin B_1, or thiamine chloride, in beriberi or clinical conditions with a lesser degree of vitamin B_1 deficiency; and thyroxin, or thyroid substance, in the hypochromic anemia associated with myxedema. It may be necessary to stop the source of blood loss in case of

hemorrhage and to treat an infection that may be in part or entirely the cause for anemia.

Chlorosis, or green-sickness, now rarely seen, is a type of anemia which occurs most frequently in adolescent girls. Gastro-intestinal disturbances, often resembling those due to hyperacidity, are common. Chlorosis is usually accompanied by constipation and frequently by intestinal putrefaction. When digestion is affected it may be necessary to put the patient on a diet similar to those used in hyperacidity or peptic ulcer. Otherwise the diet should follow the rules laid down for feeding in anemia.

Pernicious anemia The essential requirement in the treatment of pernicious anemia is that the patient receive a suitable amount of the antipernicious anemia factor, which is present in normal liver tissue and also in kidney tissue. The effectiveness of treatment with liver, kidney, or liver extract was first demonstrated by Minot and Murphy. These investigators also recommend a special diet as of general value.

The amount of liver or of liver extract to be used per day is prescribed by a physician, but this is generally in excess of 150 grams (cooked weight) of liver, or the potent extract from at least 300 to 500 grams of liver. Commercial liver extracts for intramuscular injection vary considerably in potency, and account must be taken of this when they are administered. Extracts given intramuscularly produce results more rapidly than liver or extracts given orally. This greater efficiency of the material when administered intramuscularly may be due to more satisfactory utilization of the potent substances. In the intestinal tract they may be incompletely assimilated or actually destroyed. Liver extracts are also more convenient to use and less expensive. McLester reports it as his experience, however, that the highly purified extracts, containing little else than the antianemia factor, are not as satisfactory as a solution of crude material carrying a "broader fraction of liver extract," which may supply other substances from liver of benefit to the patient.

Mention should perhaps be made again of the need of the patient to ingest a fully adequate diet that will supply all of the nutritive essentials in at least the recommended amounts. Special attention should be given to the use of foods such as muscle meats, eggs, milk, rice polishings, yeast, and wheat germ, known to be good sources of the extrinsic factor. When liver extract is given, the recommended diets may be used but without the liver.

DIET IN ANEMIA

Dietary suggestions for the anemia patient which were made with the introduction of liver therapy have been modified as changes in the form of administration of liver substance have occurred. In all cases of anemia, stress is placed on the use of an adequate diet. The diet which has become such a familiar prescription for the anemia individual was designed to contain a proper balance of elemental food substances and to supply a sufficient caloric intake. It was to be high in iron and vitamins, emphasis being given to such foods as liver, kidney, muscle meats, egg yolk, green leafy vegetables, and other green foods. Recommendations were made to eliminate those foods which are likely to produce digestive disturbances and thus operate to hinder the absorption of iron. Undue increase in weight was also advised against.

With the instigation of treatment with liver or liver extract, a patient whose blood is in a severe anemic state may not be able to take the complete diet. Within 3 to 5 days, however, the appetite usually improves and may even become excessive, so that not only the complete diet but, in occasional instances, increased amounts may be needed.

It is important to instruct the patient as to the proper intake of food. Experience has taught us variations in diet which may be indicated according to the individual's needs. The patient who needs to gain weight may increase his intake of fat. For the patient whose condition is complicated by arthritis, which occurs commonly, it may be advisable to include 1 or 2 eggs and to increase the intake of milk up to a quart per day in order to supply a plentiful amount of calcium. The milk may be skimmed if too great a tendency to gain weight is noted.

Occasionally it seems prudent also to allow a smaller intake of red muscle meats; and, particularly in the patient who has become essentially well, this may be replaced in part by chicken, fish, or shellfish as the patient may desire. The patients with complicating diseases such as renal insufficiency or diabetes should be treated according to their needs, but always keeping in mind the necessity for continuous adequate treatment by means of liver or an effective substitute.

Liver therapy Unfortunately liver therapy is not a cure for the disease. Its use, however, must be persisted in if a satisfactory condition is to be maintained. The difficulties involved in the consumption of adequate amounts of liver have been very definitely lessened by the development of an extract of liver for oral administration and later for

intramuscular injection. Although the necessity for the continued use of liver substance has not been eliminated, the actual bulk of the intake by mouth has been diminished, and the more potent effect of the solution for relatively infrequent intramuscular injection permits the discontinuance of peroral treatment if this is desired.

A comparison of the actual quantity of substance necessary under the three methods of use is interesting. The average maintenance dose of liver is from 1400 to 2100 grams per week. If liver extract is used by mouth, it will be necessary to give the substances prepared from 2300 to 3500 grams of liver in the same time, owing to the fact that in the process of commercial manufacture only approximately 60 per cent efficiency is retained even in the more potent extracts. The actual weight of solid substance taken, however, has been reduced to about 8 per cent of the weight of an equally effective dose of liver.

Because of the unusually rapid formation of red blood cells following the intramuscular use of the solution of liver extract, which contains no iron, there frequently results a depletion of the available iron reserve, a situation rarely encountered in a patient treated with whole liver, perhaps because of the iron contained therein. It therefore seems advisable in those patients receiving intramuscular treatment to emphasize particularly the use of large amounts of red meat, fruits, and green vegetables; and it is often expedient to give iron in large daily amounts sometime during the course of treatment.

Special anemia diets The patient on the standard anemia diet in the hospital should be given as nearly as possible the same close attention in regard to his food as he would receive in his own home. At the Peter Bent Brigham Hospital the patient is seen by the dietitian on the day the diet is started, so that it will be possible to cater to his likes and dislikes within the limits of the diet. The patient is admonished to take the liver, whether or not he eats anything else on the tray. It is not necessary or advisable to force food other than liver at first. Usually the appetite increases of its own accord. He is taught that fruit and vegetables should be given second consideration; and muscle meat (beef, mutton, or lamb) third. Bread, potatoes, and simple desserts are to be used merely to appease the appetite.

The physician generally indicates the form of liver to be given, whether cooked or raw. In either case, the amount of liver refused is always charted by the nurse and a record of the amount kept on file in the dietitian's office for reference by the physician. In some cases

where the problem of feeding is particularly difficult, the entire food refused is charted. Only in this way can the physician be assured that the patient is actually taking the diet as prescribed.

The patient when first starting the diet does not as a rule take it in its entirety and not infrequently is able to take little food of any sort. As calves' liver is the important food to administer at once, this must be given in small repeated doses, either broiled or in the form of raw liver pulp with fruit juice. As the patient's condition improves, other foods may be added.

Special Anemia Diets used at the Peter Bent Brigham Hospital are as follows:

STANDARD ANEMIA DIET[3]

This diet is used at the Peter Brent Brigham Hospital, and by patients after they are discharged.

Calories, 2500: protein, 135 grams; fat, 70 grams; carbohydrate, 340 grams.

	AMOUNT
1. Calves' or beef liver, cooked Since liver loses about half its weight when cooked, the patient should count on buying 320-480 grams (2/3-1 lb.) of liver each day. Kidneys and chicken livers may be substituted occasionally.	At least 160-240 grams (1/3-1/2 lb.) daily
2. Fresh fruit (10% carbohydrate)[4] Cooked fruit may be used freely, particularly if a laxative effect is desired. Raisins may be eaten freely if desired.	About 400 grams (4 average servings)
3. Vegetables (appr. 3% and 6% carbohydrate)[5]	At least 500 grams (appr. 3 full saucers)

[3] Originally arranged by Drs. George R. Minot and William P. Murphy of the Peter Bent Brigham Hospital, Boston, Mass.; revised by Dr. Murphy.

[4] Ten per cent fruits: Strawberries, peaches, apricots, oranges, grapefruit, pineapple, lemons, cranberries, blackberries.

[5] Three per cent vegetables: Cucumber, asparagus, rhubarb, endive, sauerkraut, beet greens, dandelions, Swiss chard, celery, mushrooms, tomatoes, Brussels sprouts, water cress, okra, cauliflower, eggplant, cabbage, radishes, leeks, string beans (canned), French artichokes, spinach.

Six per cent vegetables: String beans, pumpkin, turnip, kohlrabi, squash, beets, carrots, onions, green peas.

	AMOUNT
4. Meat, red muscle such as beef, mutton, and lamb, cooked rare Clear soups with fat removed or any vegetable soup may be taken.	120 grams (1/4 lb.)
5. Starchy foods Cereals,[6] bread (whole-wheat or graham, toasted, potatoes and simple desserts.	According to individual taste to make a well-rounded diet
6. Sugar	Restricted to 3 level tsp. a day
7. Milk It should not, however, be taken to the exclusion of other important food substances. The amount of cream used must be controlled by the patient's state of nutrition.	According to the patient's needs
8. Salt and condiments	Avoid using to excess
9. Tea or coffee	As desired

ANEMIA DIET FOR OUT-PATIENTS

This diet is used in the Out-Patient Department of the Peter Bent Brigham Hospital in Boston.

Calories, 2364: protein, 118 grams; fat, 100 grams; carbohydrate, 248 grams.

	AMOUNT GIVEN	
Morning:	GRAMS	MEASURE
Fresh fruit, 10% *	100	1 serving
Cereal	100	1 serving
Shredded wheat		
Cornflakes		
Oatmeal		
Pettijohns		
Wheatena		
Egg		1
Toast	60	2 slices

[6] Shredded wheat, cornflakes, oatmeal, Pettijohns, Wheatena.

ANEMIA DIET FOR OUT-PATIENTS—Continued

	AMOUNT GIVEN GRAMS	MEASURE
Morning (continued):		
Whole-wheat bread toasted, graham toast, or zwieback		
Butter	15	1 level tbsp.
Sugar	10	2 level tsp.
Cream, 40% (heavy)	60	¼ cup
Milk	240	1 full glass
Noon:		
Red muscle meat (beef *or* lamb)	120	1 serving
Potato	120	1 serving
Green vegetables, 3% and 6%†	300	2 saucerfuls
Toast	30	1 slice
Butter	15	1 level tbsp.
Sugar	5	1 level tsp.
Simple desserts as puddings, gelatin, blanc mange, *or* fresh fruit, 10%		1 serving
Night:		
Soup, clear vegetable	240	1 serving
Potato, macaroni, *or* rice	120	1 serving
Green vegetables, 3% and 6%	300	2 saucerfuls
Toast	30	1 slice
Butter	15	1 level tbsp.
Sugar	5	1 level tsp.
Simple dessert *or* fresh fruit, 10%	100	1 serving

* See Footnote 4, page 300.
† See Footnote 5, page 300.

NOTE: At least ⅓ to ½ lb., cooked weight, of beef or calves' liver or an effective substitute such as raw liver pulp or the prescribed liver extract must be taken daily until the red blood cell count reaches a normal level, after which smaller amounts of effective liver substance may be sufficient to maintain it at this level. If liver is taken cooked, count on buying 2/3 to 1 lb. liver each day as it loses approximately half its weight in cooking. If liver is taken raw as pulp, ½ lb. of raw liver is sufficient. Kidneys or chicken liver may be taken for variety.

Avoid excessive fats and all fried foods and sweet desserts as pastries, etc. No concentrated sweets as jams, jellies, candies, syrups, etc.

Avoid excess of salt.

Fish or chicken may be taken as desired but must not replace materially the red muscle meat.

Tea and coffee as desired.

Fresh fruit, 10%, as desired; cooked prunes, cooked apricots, cooked apples once a week only.

One or two eggs may be taken daily. Milk as desired according to the patient's needs.

SAMPLE DIET I—Diet Started with Cooked Liver

Calories, 1990: protein, 115 grams; fat, 70 grams; carbohydrates, 225 grams.

	AMOUNT GIVEN	
	GRAMS	MEASURE
Morning:		
Orange	100	1
Cornflakes	12	1 saucer
Whole-wheat toast	30	1 slice
Butter	10	2 level tsp.
Sugar	5	1 level tsp.
Whole milk	180	3/4 household measuring cup
Cream, 40% (heavy)	30	2 tbsp.
Coffee or tea as desired		
Noon:		
Liver	120	4 oz.
Baked potato	120	1
Tomatoes	150	1 large saucer
Whole-wheat toast	30	1 slice
Butter	10	2 level tsp.
Sugar	5	1 level tsp.
Rice and raisin pudding		1 serving
Whole milk	60	1/4 household measuring cup
Coffee or tea as desired		
Night:		
Broiled liver	120	4 oz.
Beef broth	200	1 teacup
Rice (cooked weight)	50	2 level tbsp.
or		
Riced potato	120	1 medium serving
String beans	150	1 large saucer

SAMPLE DIET I—Diet Started with Cooked Liver—Continued

Night (continued):	Amount given: Grams	Measure
Whole-wheat toast	30	1 slice
Butter	10	2 level tsp.
Sugar	5	1 level tsp.
Grapefruit	100	½
Whole milk	60	¼ household measuring cup
Tea or coffee as desired		

Usually within a week of the time that this diet is started, the patient's appetite increases, and more food can be given as shown in Diet II which has more.

SAMPLE DIET II—Full Diet with Cooked Liver

Calories, 2500: protein, 135 grams; fat, 70 grams; carbohydrates, 280 grams.

	Amount given: Grams	Measure
Morning:		
Orange	100	1
Shredded wheat	30	1 biscuit
Whole-wheat toast	60	2 slices
Butter	10	2 level tsp.
Sugar	5	1 level tsp.
Cream, 40% (heavy)	30	2 tbsp.
Whole milk	180	¾ household measuring cup
Coffee or tea as desired		
Noon:		
Broiled liver	120	4 oz.
Baked potato	120	1
Lettuce		
Cucumber	50	8 thin slices
Mineral oil mayonnaise [7]		
Carrots and peas	150	1 large saucer
Whole-wheat toast	60	2 slices
Butter	10	2 level tsp.
Sugar	5	1 level tsp.
Plain blanc mange with fruit		1 serving
Milk	60	¼ household measuring cup
Coffee or tea as desired		

[7] See page 310.

Night:	AMOUNT GIVEN GRAMS	MEASURE
Liver	120	4 oz.
Clear meat broth with fat removed	200	1 teacup
Spaghetti	100	1 large saucer
Tomatoes	150	
Cauliflower	150	1 large saucer
Celery hearts	50	2 hearts
Whole-wheat toast	60	2 slices
Butter	10	2 level tsp.
Sugar	5	1 level tsp.
Grapefruit	100	½
Coffee or tea as desired		

Often the physician desires the patient to take raw liver pulp rather than the cooked liver. In this case, the liver drink is given between meals and taken as medicine rather than food. A low diet is given at first.

SAMPLE DIET III—Diet Started with Liver Pulp

Calories, 2035: protein, 105 grams; fat, 75 grams; carbohydrates, 235 grams.

Morning:	AMOUNT GIVEN GRAMS	MEASURE
Strawberries	100	10
Cornflakes	12	1 saucerful
Egg	30–50	1
Whole-wheat toast	30	1 slice
Butter	10	2 level tsp.
Sugar	5	1 level tsp.
Cream, 40% (heavy)	30	2 level tbsp.
Milk	180	¾ household measuring cup
Coffee or tea as desired		
10 A.M.		
Liver pulp	60	From 120 grams raw liver (4 oz.)
Water	60	¼ household measuring cup
Orange juice	100	Juice of 2 oranges

SAMPLE DIET III—Diet Started with Liver Pulp—Continued

	Amount Given: Grams	Amount Given: Measure
Noon:		
Baked potato	120	1 large
Lettuce		
Tomatoes	100	1 medium saucer
Mineral oil mayonnaise		
Celery hearts	50	2 hearts
Whole-wheat toast	50	1 slice
Butter	10	2 level tsp.
Sugar	5	1 level tsp.
Tapioca cream		1 serving
Milk	60	¼ household serving cup
Coffee or tea as desired		
3:00 P.M.:		From 90 grams raw liver (3 oz.)
{Liver pulp	60	
{Water	60	¼ household measuring cup
Orange juice	100	Juice of 2 oranges
Night:		
{Rice	120	1 medium saucer
{Butter	5	1 level tsp.
Spinach	150	1 large saucer
Whole-wheat toast	30	1 slice
Butter	5	1 level tsp.
Sugar	5	1 level tsp.
Grapefruit	100	½

After Diet III is started, the liver pulp is increased about 20 grams each day at 10 A.M. and 3 P.M. until the patient is taking at least 90 grams twice a day, or 180 grams per day, the amount from 240 grams, or ½ pound, of liver.

SAMPLE DIET IV—Full Diet List with Raw Liver

Calories, 2515: protein, 140 grams; fat, 75 grams; carbohvdrates, 320 grams.

	Amount Given: Grams	Amount Given: Measure
Morning:		
Grapefruit	100	½
Cornflakes	12	1 cereal dish
Egg	30–50	1
Whole-wheat toast	60	2 slices
Butter	10	2 level tsp.

	AMOUNT GIVEN	
Morning (continued):	GRAMS	MEASURE
Sugar	5	1 level tsp.
Cream, 40% (heavy)	15	1 level tbsp.
Milk	180	3/4 household serving cup
Coffee or tea as desired		
10:00 A.M.:		
{ Liver pulp	90	From 120 grams liver (4 oz.)
{ Water	90	3/8 household measuring cup
Orange juice	100	Juice of 2 oranges
Noon:		
Baked potato	120	1 large
Spinach	150	1 large saucer
Sliced beets	100	1 medium saucer
Celery hearts	50	2 hearts
Whole-wheat toast	60	2 slices
Butter	5	1 level tsp.
Sugar	5	1 level tsp.
Lemon jelly		1 serving
Cream, 40%, whipped	15	1 tbsp.
3:00 P.M.:		
{ Liver pulp	90	From 120 grams liver (4 oz.)
{ Water	90	3/8 household measuring cup
Orange juice	100	Juice of 2 oranges
Night:		
Escalloped potato, sliced	120	1 large potato
Milk	60	1/4 household measuring cup
Butter	5	1 level tsp.
Carrots	150	1 large saucer
String beans	150	1 large saucer
Whole-wheat toast	60	2 slices
Butter	5	1 level tsp.
Sugar	5	1 level tsp.
Prune pudding		1 serving
Coffee or tea as desired		

When it is exceedingly difficult for the patient to take liver in any appreciable amount, it will be necessary to rearrange the diet to meet this difficulty. Diet V is a diet of this type written for a patient with a particularly capricious appetite.

SAMPLE DIET V—With Limited Amount of Liver

Calories, 2050: protein, 110 grams; fat, 70 grams; carbohydrates, 245 grams.

	AMOUNT GIVEN	
	GRAMS	MEASURE
Morning:		
Orange juice	90	Juice of 2 medium oranges
Oatmeal (cooked weight) if desired	100	1 medium serving
Egg	30–50	1
Whole-wheat toast	30	1 slice
Butter	5	1 level tsp.
Suger	5	1 level tsp.
Cream, 40% (heavy)	15	1 level tbsp.
Milk	180	¾ household measuring cup
Coffee or tea as desired		
10:00 A.M.:		From 120 grams raw liver (4 oz.)
Liver pulp	60	
Water	60	¼ household measuring cup
Lemon juice (added just before taking)	20	1 tbsp. and 1 tsp.
Orange juice	100	Juice of 2 oranges
Noon:		
Beef broth with fat removed	200	1 teacup
Green pepper stuffed with		1
sieved liver	60	2 oz.
Baked potato	90	1 small
Carrots and peas	100	1 medium saucer
Whole-wheat toast	30	1 slice
Butter	10	2 level tsp.
Sugar	5	1 level tsp.
Rennet-custard	100	1 serving
Coffee or tea as desired		
3:00 P.M.:		
Beef juice	90	⅜ household measuring cup
Night:		
Tomato broth	200	1 teacup
Sieved liver	60	¼ household measuring cup
Escalloped potato, sliced	90	1 small
Milk	60	¼ household measuring cup
Bread crumbs		
Butter	5	1 level tsp.
Spinach	100	1 medium saucer

	AMOUNT GIVEN GRAMS	MEASURE
Night (continued):		
Celery hearts	50	2 hearts
Whole-wheat toast	30	1 slice
Butter	5	1 level tsp.
Sugar	5	1 level tsp.
Coffee gelatin		1 serving
Cream, 40%, whipped	15	1 level tbsp.
Coffee or tea as desired		
Bedtime:		
Iced orange juice	120	½ household measuring cup
or		
Broth with fat removed	200	1 teacup
Whole-wheat toast	30	1 slice
Butter	5	1 level tsp.

LIVER RECIPES

Murphy and Howard believe that broiled liver or the raw pulp are the preferable forms to use and that other recipes are superfluous. Certainly liver fried or cooked in any way with fat is less desirable.

LIVER JUICE

Score raw liver and sear slightly in a pan for less than a minute. Then squeeze out the juice through several folds of gauze. Two pounds of liver will yield about 150 c.c. of juice. Serve cold. Orange juice may be served after or with it.

SCRAPED OR SIEVED LIVER

Dash the liver into hot water and remove the skin. Broil the liver 5 to 10 minutes until cooked through and scrape through a sieve.

LIVER PULP

Put raw liver through a vegetable or meat grinder several times, using the finest attachment. Add enough cold water to the pulp to make it the consistency of heavy cream and strain, using a coarse sieve or potato ricer. Beat with an egg beater before taking. One tablespoon of lemon juice may be added before drinking, and orange juice may be taken after it. There

is a loss of about one-quarter in weight in preparing the liver pulp. Example—90 grams of liver pulp will result from 120 grams of raw calves' liver.

ORANGE JUICE AND LIVER

50 to 100 grams liver, ground 3 times
50 to 150 grams orange juice

Serve very cold as an intermittent nourishment. Give twice a day if the patient will take it.

Calories,[8] 85: protein, 10 grams; fat, 2 grams; carbohydrate, 6 grams.

LIVER SOUP

120 grams scraped or sieved liver
200 c.c. clear broth

Clear chicken or tomato broth may be used with the fat removed. Season with onion if desired.

Calories, 185: protein, 28 grams; fat, 7 grams; carbohydrate, 2 grams.

CREAMED LIVER SOUP

(Two servings)

120 grams chopped liver	4 tbsp. flour
220 c.c. milk	10 grams butter

Make white sauce and add the liver. Heat well and serve.

Calories, 500: protein, 34 grams; fat, 24 grams; carbohydrate, 37 grams.

BROILED LIVER

Dash the liver into hot water, remove the skin, and slice. Broil until done or panbroil in mineral oil. Four minutes is generally allowed for cooking.

MINERAL-OIL MAYONNAISE

1 egg yolk	Vinegar, salt, pepper, mustard
480 c.c. mineral oil	to taste

Beat the egg yolk until stiff. Beat in 1 teaspoon vinegar and add the oil drop by drop, beating constantly. Add vinegar to thin to the desired consistency and finally add seasoning.

[8] Calculated with 50 grams each.

QUESTIONS FOR STUDY

1. What is anemia? Into how many main groups may anemias be divided, and what are they?
2. What are the general characteristics of a proper diet for anemia? How does it differ from an ordinary diet?
3. What is hemoglobin? What substances are necessary for its formation?
4. What particular foods are considered especially helpful in anemia?
5. Discuss the value of iron in anemia. Name five foods rich in iron.
6. What special advantage has liver in diets for anemia?
7. Name several ways in which you could use liver if a patient objected to eating it.
8. What advantage is gained by giving the solution of liver extract intramuscularly?

16.
DISEASES OF THE HEART [1]

The diet in general The main object in treatment of all significant disturbances of the heart is to maintain or improve the nutritional state of the patient and at the same time impose the smallest burden on the heart. Diet may have a considerable influence on the ability of the heart to do its work and, also, on its efficiency. Restriction of food intake is of the utmost importance in treatment of cardiac diseases. The resultant reduction in body weight lessens the work required of the heart and at the same time increases its efficiency by lowering the level of energy exchange. These benefits are most apparent in the case of the obese individual, but they also help the individual whose weight is normal.

Reduction in total calorie intake is the item of first consideration in dietary treatment of cardiac failure. In making this dietary restriction care must be taken to keep the diet well-balanced and adequate. The bulk of the energy should come from carbohydrate. Because protein tends to accelerate heart action, the protein content of the diet should be restricted. Special consideration should be given to the vitamin and mineral content. The liberal use of fresh fruits and vegetables and milk (skimmed) will generally take care of this problem.

The type of diet used varies considerably according to whether cardiac decompensation exists and according to the degree and stage of such decompensation and the amount of cardiac dropsy.

CHRONIC HEART DISEASE WITHOUT EDEMA

As in all chronic diseases, the diet must be continued for a long time, probably for the rest of the patient's life, and should therefore furnish all the dietary essentials. It should prevent undernutrition, which might

[1] This chapter was prepared by Dr. E. G. Bannick, formerly associate professor in medicine, the Mayo Foundation, University of Minnesota and head of the Section in Medicine at the Mayo Clinic, Rochester, Minn. Approved by Dr. Bannick, 1944.

further weaken the heart, but it should never allow the patient to become overweight, for this will increase the work of the heart and aggravate the disturbance of its functions. If he is already obese, a slow reduction of weight will decrease the burden on the heart. Weight reduction in all cases of heart disease should be carried out under the supervision of a physician.

The diet should provide enough bulk to prevent constipation. Adequate amounts of fruits and vegetables will usually accomplish this. Where roughage foods are not well tolerated, a more bland type of diet may be used, in which case a bulk-producing substance may be added if necessary.

It is usually advisable to restrict the amount of tea and coffee to about one cup of each daily.

Foods likely to cause indigestion should be carefully avoided, since the production of excessive gas in the stomach or intestines may result in pressure against the diaphragm, which in turn may not only cause cardiac embarrassment but may even induce an acute heart attack. Hearty meals should be avoided for the same reason. If necessary, 4 or 5 light meals may be substituted for the usual number.

CHRONIC HEART DISEASE WITH EDEMA

The diet should be essentially low in salt, fluid, and protein, and relatively high in carbohydrates. The caloric value is always adjusted to the energy requirement. Such a diet is similar to that used in the treatment of nephritis with edema, although it may differ somewhat for the following reasons:

In chronic cardiac dropsy, diuretics alone are usually more efficient than in cases of dropsy due to chronic nephritis; therefore, the salt and water restriction may not need to be so rigid in the former.

Secondly, there may be some difference in the protein requirement. In chronic heart disease with edema, there is usually no significant protein loss from the body; therefore, the serum proteins are usually at about the normal level, and the protein content of the diet can be reduced safely to from 40 to 50 grams a day.

This reduction is advisable because of the specific dynamic action of the proteins in increasing metabolism and because it permits a diet relatively higher in carbohydrate, which is generally considered desir-

able. Later on, if the patient improves, it is advisable to increase the protein content of the diet 10 or 15 grams.

In edema due to chronic nephritis, however, there is usually some diminution of the serum proteins, resulting chiefly from marked loss of albumin in the urine, and it is important in such cases not to restrict the protein too much. In certain cases (of the nephrosis type) the diet may even be high in protein.

With the development of such efficient diuretics as salyrgan, and mercupurin, ammonium nitrate, and the xanthine compounds to add to the time-honored digitalis, the management of edema due to chronic heart disease has become less difficult, particularly from the dietetic standpoint.

In the ordinary case a diet similar to the following one is very satisfactory.[2] No salt is added in the preparation of the food and the intake of fluid should be restricted to 1000 or 1200 c.c. daily.

DIET FOR HEART DISEASE WITH EDEMA

Calories, 1825: protein, 47 grams; fat, 87 grams; carbohydrates, 213 grams.

	AMOUNT
Breakfast:	
Grapefruit	½
Cream of wheat	1 serving
Cream	⅕ cup
Sugar	2 level tsp.
Bread	2 small slices
Butter	1 square
Jelly	1 tsp.
Dinner:	
Broiled steak	1 small serving
Mashed potatoes	1 serving
Baked squash	1 good-sized serving
Lettuce salad	⅕ head
Mayonnaise	1 tsp.
Bread	1 small slice
Butter	2 squares
Cream	2 tbsp.
Pineapple sauce	1 serving
Sugar	1 level tsp.
Milk	½ glass

[2] The diets in this chapter have been arranged by Dr. Bannick and Mary A. Foley while associated with the Mayo Clinic, Rochester, Minn. Approved by Dr. Bannick, 1944.

Supper:	AMOUNT
Escalloped macaroni and cheese	1 serving
Stewed tomatoes	1 serving
Bread	1 small slice
Butter	1 square
Cream	1 tbsp.
Baked apple	1 of average size
Sugar	1 level tsp.
Milk	½ glass

In more obstinate cases, however, salt and water must be further restricted. Occasionally it may be advisable to use a diet very low in water and mineral content, such as described on pages 330-331.

ACUTE CARDIAC FAILURE

In acute cardiac failure (Coronary occlusion and Angina pectoris) the diet should be low in protein for reasons which have been stated. It should contain only food that is easily digested, usually restricted in the beginning of the treatment to liquids or to soft foods. It should be relatively high in carbohydrate in an endeavor to increase the glycogen in the heart muscles, and it should usually be given in frequent small feedings to avoid gastric retention and fermentation.

An example of such a diet is given in Diet No. I.

CARDIAC DIET NO. I

Calories, 1650: protein, 42 grams; fat, 76 grams; carbohydrate, 200 grams; fluid, 1100 c.c.

Breakfast:		AMOUNT
Orange juice		⅔ glass
Cereal guel	Cereal	1 small serving
	Milk	¼ glass
	Cream	¼ glass
	Sugar	2 level tsp.
10:00 A.M.:		
Eggnog	Egg	1
	Milk	1 glass
	Sugar	1 level tsp.

CARDIAC DIET NO. I—Continued

		AMOUNT
Dinner:		
Cream of pea soup		½ cup
Orange sherbet		½ cup
2:00 P.M.:		
Pineapple eggnog	Pineapple juice	½ glass
	Sugar	1 level tsp.
	Egg	1
4:00 P.M.:		
Ice cream		⅝ cup
Supper:		
Rice gruel	Rice	1 small serving
	Milk	⅔ glass
	Cream	¼ cup (scant)
	Sugar	2 level tsp.
Soft custard		½ cup
8:000 P.M.:		
Fruit juice		½ glass
Sugar		1 level tsp.

When edema is present, the fluid intake is restricted to 1000 to 1200 c.c., and no salt is used in the preparation of the food.

When the patient is acutely ill with congestive heart failure, particularly if he is edematous and has marked visceral congestion, the Karell Diet (page 328) or the Karell Diet as modified by Bannick and Smith [3] (page 329) may be advisable for a short period, since they are very low in salt, water, and quantity of food and are easily digested. However, because of the low caloric value and the low carbohydrate content of these diets, it is important to increase the calories soon, particularly the carbohydrates, along the line suggested in Diet No. I.

The modified Karell Diet is preferred over the Karell Diet because it provides more variety and allows some extra water without increasing the fluid or salt content, and since it can be easily still further modified. The efficiency of the diuretics in acute cardiac dropsy makes it less essential to use either diet in its strict form.

As the patient's condition improves the diet is gradually increased,

[3] E. G. Bannick, M.D., and Florence H. Smith, "The Karell Diet and a Modified Karell Diet in the Treatment of Cardiac Dropsy," in *Journal of the American Dietetic Association,* Vol. 2, pp. 246-9.

usually on the third or fourth day, along the lines indicated in Diet No. II.

CARDIAC DIET NO. II

Calories, 1840: protein, 41 grams; fat, 69 grams; carbohydrate, 284 grams; fluid, 850 c.c.

	AMOUNT
Breakfast:	
Orange juice	½ glass
Applesauce	1 serving
Farina	1 small serving
Cream	¼ glass
Bread	1 small slice
Butter	½ square
Orange marmalade	1 tsp.
Sugar	2 level tsp.
10:00 A.M.:	
Milk	1 glass
Dinner:	
Cream of tomato soup	1 cup
Crackers	3 small
Egg soufflé	1 serving
Bread	1 small slice
Butter	1 square
Baked pear	1
3:00 P.M.:	
Grape juice and lemon juice	½ glass
Sugar	2 level tsp.
Supper:	
Rice cooked in milk	1 serving
Sugar	2 tsp.
Poached egg on toast	1 egg, 1 small slice bread
Butter	1 square
Jelly	1 tsp.
Apricot sauce	1 serving
8:00 P.M.:	
Orange juice	½ glass

As improvement continues, the number of feedings is decreased, and cooked vegetables and fruits are added. Tender meat or fish may be substituted for some of the milk or eggs.

Diet No. III is a sample of the diet at this stage of the convalescence.

From this stage of the convalescent period, the diet should vary with the individual needs of the patient. Care should be taken for some time in the selection of the diet according to the general principles that have been described in the preceding pages.

CARDIAC DIET NO. III

Calories, 2105: protein, 50 grams; fat, 84 grams; carbohydrate, 287 grams.

	AMOUNT
Breakfast:	
Banana	1 of average size
Oatmeal	1 small serving
Cream	1/5 glass
Milk	1 glass
Bread	1 small slice
Butter	1/2 square
Sugar	2 level tsp.
Orange marmalade	1 tsp.
Dinner:	
Cream of celery soup	1 cup
Crackers	3 small
Potato	1 average size
Asparagus	1 serving
Lamb chop	1 small chop
Mint jelly	1 tsp.
Bread	1 small slice
Butter	1 1/2 squares
Peach sauce	1 serving
Cream	2 tbsp.
3:00 P.M.:	
Fruit juice	1/2 glass
Sugar	1 tsp.
Supper:	
Vegetable soup (no meat stock)	1 cup
Omelet	1
Creamed potato	1 small serving
Bread	1 slice, small
Currant jelly	1 tsp.
Butter	1 square
Milk	1 glass
Pear sauce	1 serving
Cream	1 tbsp.
Sugar	1 tsp.
8:00 P.M.:	
Lemonade	1/2 glass
Lemon juice, Orange juice	1/4 glass
Sugar	2 tsp.
Water	

ARTERIAL HYPERTENSION [4]

High blood pressure is frequently termed arterial hypertension. Hypertension, as far as disease is concerned, applies to high blood pressure as a result of abnormal processes within the body which are more or less chronic or permanent.

Systolic and diastolic blood pressure In measuring blood pressure, the rubber bladder of the sphygmomanometer is inflated until the air pressure neutralizes the blood pressure coming through an artery. This is known as the systolic pressure and represents the tension to which the blood vessels are subjected under the full force of the heart beat.

As the air pressure is released, the pulse beat is detected by a stethoscope, and the lower figure, at which it disappears, is recorded as the diastolic blood pressure, representing the minimum strain on the arteries and their natural resistance which the heart must overcome in forcing the blood through them.

The term hypertension is usually applied to high systolic pressure for the reason that this pressure suffers greater deviation on the average than does the diastolic and is generally regarded an index to the functioning powers of the heart.

However, the diastolic pressure, showing the resistance of the arteries, is just as important; for it reveals conditions of hardness of the arteries, or arteriosclerosis. Many physicians attach more importance to the diastolic figure than to the systolic as it reflects better the state of the arteries and heart muscle.

Variations in blood pressure Age, sex, heredity, general health, weight, size, time of day, time of eating, climatic conditions, position of the body, state of mind, and many other things may affect the blood pressure. Under severe physical strain it may rise as high as 200 mm., while after 2 hours of slumber it may fall 20 points below the average. So, instead of "normal," blood pressure is now being spoken of as "average." A systolic pressure of over 150 mm. is commonly regarded as evidence of a pathologic hypertension. Woley's figures for the average systolic pressure as determined by examination of 1000 individuals are as follows:

AGE	AV. SYST. PRESSURE	AGE	AV. SYST. PRESSURE
15–30	122	41–50	130
31–40	127	51–60	132

[4] This section was prepared by Dr. Frederick M. Allen, member of the staff of Polyclinic Hospital, New York City.

Cause The causes of hypertension are usually described as either functional or organic. In the functional type the blood pressure will return to average if the cause of the functional disturbance is removed. The organic cases are due to some structural change in the heart, the blood vessels, or other organs, such as the kidneys. However, we have but little positive knowledge as to the actual cause of high blood pressure. It may be metabolic, degenerative, or infectious.

Symptoms Many patients with hypertension show no symptoms. Others have attacks of dizziness, ringing in the ears, shortness of breath on exertion, tachycardia, irritability, and insomnia; they are easily fatigued and may have all manner of gastro-intestinal symptoms.

Allen's diet The diet should aim to spare the heart, kidneys, and arteries. The protein allowance is generally moderately restricted as a precaution against possible kidney impairment. If there is associated nephritis, the protein allowance should be reduced in proportion to its severity.

No distinction need be made between red meats and other forms of protein. Stimulants such as alcohol, coffee, or strong tea should be restricted or abolished. According to recent investigations, tobacco has a particularly injurious influence upon the arteries and should be prohibited.

According to the teaching of Frederick M. Allen, which also has been adopted by Volhard in Europe and by numerous other clinics, the essential treatment consists in the strictest possible salt-free diet.

This means avoidance of the use of salt at table and in the cooking, and also the avoidance of foods such as bacon, salt, fish, cheese, baker's bread, ordinary butter, etc., which are salted before purchase. Most natural foods are permitted, with the exception of shellfish, etc., but large quantities of milk are avoided because of the content of both salt and water.

Vegetables, especially those of high salt content such as celery and beets, are sometimes boiled through two waters to remove some of the natural salts. The same is generally done with ocean fish.

Raw salads are allowed, and salt-free bread, unsalted butter, etc., may be used freely.

Oatmeal and other cereals are allowed when cooked without salt. Useful ready-prepared cereals are puffed wheat, puffed rice, shredded wheat, and rippled wheat; but corn flakes and most other commercially prepared cereals are excluded because of their salt content.

The orthodox Jewish matzohs are a useful bread substitute when salt-free bread is not obtainable, but other crackers usually contain too much salt.

The salt-free diet should always be controlled by occasional laboratory analysis of 24-hour urine samples. While the ordinary salt-free diets in hospitals often yield between 2 and 4 grams of sodium chloride, the hypertension diet should reduce the total sodium chloride of the urine close to 1 gram in each 24 hours. A surplus above this amount indicates some error in the diet.

This strictness also demands skill and imagination on the part of the dietitian in order to make the diet varied and appetizing. It should be remembered that salt is only one out of many condiments. All the others, including vinegar, lemon juice, mustard, horseradish, pepper, paprika, and all other spices, sage, thyme, dill, parsley, and all other herbs, also strong-flavored vegetables such as raw onion and garlic, along with sugar, caramel, citron, orange or lemon peel, and many other flavoring agents, permit the diet to be satisfying for indefinite periods when competently prepared. Artificial salt substitutes available on the market are not fully satisfactory and are seldom needed.

A normal person can seldom endure a strict salt-free diet for more than a few days because of symptoms of salt deficiency, especially loss of appetite, perhaps vomiting, weakness, and possibly muscular pains. These symptoms are quickly and completely relieved by the giving of 1 or 2 grams of salt. Nearly all patients with pronounced hypertension or nephritis can tolerate the strict salt-free diet indefinitely without such symptoms. If these symptoms occur in an occasional case, they should be corrected by the giving of a minimal quantity of salt, such as 1 or 2 grams, which can usually again be discontinued after a few days. In some milder cases a low salt ration of this kind may be necessary or permissible permanently.

This diet sometimes acts very quickly in relieving headache, dizziness, dyspnea, retinitis, and other symptoms or complications. In more stubborn cases the effects are very gradual and are perceptible only after continuance of accurate diet for many months. Inasmuch as puerperal eclampsia belongs to this class of disorders, this same diet is most efficient for both prevention and treatment of this complication of pregnancy. For certain conditions of hypertension a diet high in rice has been suggested. This is described on page 333.

Sansum's treatment [5] Sansum, Blatherwick, and Nuzum have made extended research in nephritis and hypertension, and as a result present another theory regarding the cause of hypertension and suggest a corresponding dietetic treatment.

They say, "We believe that the blood vessel changes which are responsible for high bood pressure are due, in part at least, to a diet error in which the acid-ash foods are consumed in excess of the alkaline-ash foods. We believe that this in turn results in a slight decrease in the very delicate balance of the body, with resulting blood vessel damage. We believe that the changes take place slowly over perhaps years of time.

"For our overweight hypertension cases we use reducing diets containing up to 90 grams of protein, including meat, provided there is no kidney damage. For our normal weight and underweight hypertension patients we use alkaline or semialkaline diets containing generous amounts of fruits, vegetables and milk.

"In explanation, the acid-ash foods are the cereals and meats, including fish, shellfish, fowl and eggs. The alkaline-ash foods are fruits, vegetables, nuts and milk. The neutral foods are the pure starches, sugars, and fats. We believe that a normal diet should be balanced to include a sufficient amount of the alkaline-ash foods to neutralize all of the acid-ash foods used." [6]

The menus which follow illustrate the type of food used in such a diet.

SANSUM'S BASIC OR ALKALINE-DIET MENUS

MENU NO. I

Breakfast:	Luncheon:	Dinner:
Orange juice	Cream of spinach soup	Browned potatoes
Applesauce	Baked potato	Buttered carrots
Bacon	Fresh asparagus	Swiss chard
Lima-bean bread toast	Lima-bean bread	Pineapple and cottage cheese salad with French dressing
Butter	Butter	Lima-bean bread
Orange marmalade	Fresh apricots	Butter
Milk *or* cocoa	Orange juice	Fresh blackberries
	Milk	Orange juice
		Milk

[5] Courtesy of W. B. Sansum, M.D., Sansum Clinic, Santa Barbara, California. He is the author, with R. A. Hare and Ruth Bowden, of *The Normal Diet and Healthful Living,* New York: The Macmillan Co., 1936.

[6] For tables of acid- and alkaline-ash foods, see Table 3, page 671.

MENU NO. II

Breakfast:
- Orange juice
- Cantaloupe
- Bacon
- Soybean bread toast
- Butter
- Apple jelly
- Milk *or* cocoa

Luncheon:
- Cream of tomato soup
- Baked sweet potato
- Fresh spinach
- Soybean muffins
- Butter
- Apple
- Cheese
- Orange juice
- Milk

Dinner:
- Potatoes diced in cream
- Mashed turnips
- Buttered peas
- Head lettuce with French dressing
- Soybean bread
- Butter
- Fresh raspberries
- Orange juice
- Milk

QUESTIONS FOR STUDY

DISEASES OF THE HEART

1. What is the object of the diet in any heart disturbance?
2. Discuss the diet in chronic heart disease without edema.
3. What is the effect of obesity in heart disease? Of emaciation?
4. Discuss the diet in chronic heart disease with edema. In what ways may it differ from the diet in chronic nephritis with edema?
5. Discuss the diet in acute cardiac failure and describe the changes in the diet as recovery takes place.
6. Describe the Karell Diet and its modification by Bannick and Smith.
7. When are these diets used in heart disease? What are their advantages and disadvantages?

HYPERTENSION

1. Distinguish between systolic and diastolic blood pressure.
2. What types of food should be used in a diet for arterial hypertension?
3. Discuss the use of salt in hypertension.
4. What foods may cause trouble?
5. What foods are base-forming?
6. Write a diet list for a patient suffering from high blood pressure.

17. DISEASES OF THE KIDNEY AND URINARY TRACT [1]

NEPHRITIS

In diseases of the kidney, the purpose of dietary treatment is twofold: (1) to correct the alterations in metabolism caused by disordered renal function and (2) to retard the progress of the structural lesion and promote healing by adjusting the load the kidney must carry. To accomplish these aims, the requirements of the patient for water, salt, protein, and minerals must be determined, and the kind of diet given is prepared in the light of these determinations.

Classification The most commonly used classification of diseases of the kidney is the following:

1. *Inflammatory type,* or glomerulo-nephritis. This is characterized by retention of nitrogen, high blood pressure, profuse urination at night, anemia, and in the late stages by signs of cardiac failure. There is no retention of chlorides, no edema, and albuminuria is usually slight.

2. *Degenerative type,* or nephrosis. This is a form of chronic nephritis with edema, characterized by degenerative changes of kidney tubules, albuminuria, increase of blood fat and cholesterol, decreases in the plasma protein, and retention of chlorides. There is usually no retention of nitrogen and no increase in blood pressure. Slight anemia is common.

A pure nephrosis is very rare, but nephritis with a nephrotic component is fairly common. In all probability the kidneys play only one part in this disease. Disorders of metabolism not thoroughly understood are often of greater importance than the nephritis.

3. *Vascular, or sclerotic, type.* This occurs sometimes without signs

[1] This chapter was prepared by Dr. James P. O'Hare, assistant professor of medicine, Harvard Medical School; senior associate in medicine, Peter Bent Brigham Hospital, Boston, Mass. It was revised in 1944 by Dr. Francis D. Murphy, head of the Department of Medicine, Marquette University School of Medicine; clinical director of the Milwaukee County General Hospital, Milwaukee, Wis.

of renal disturbance, but in the later stages is accompanied by disease of the kidney, of the myocardium, and usually of the arteries.

Cause At present we do not know what part, if any, diet plays as a causative factor in nephritis. An inherited constitutional predisposition appears to play a very important role, especially in the chronic hypertensive type occurring after middle life. Sometimes several members of the same family are affected, and similar conditions are found in the history of their parents. Infection caused by bad tonsils or scarlet fever sometimes causes nephritis, probably anaphylactically. Chemical agents such as mercury, arsenic, turpentine, lead, various acids, etc., may also cause acute or chronic nephritis.

DIETARY ADJUSTMENT IN NEPHRITIS

The diet, in any stage of nephritis, is regulated to meet these two requirements: (1) It must limit the work of the kidney to promote healing or at least to prevent further damage to that organ; and (2) provide adequate protein and other essential elements to maintain health.

Protein A diet low in protein may prevent further kidney damage, but it might also undermine the general health of the patient. Similarly, a diet high in protein may improve the general health of the patient, but it might also retard recovery of the renal lesion. However, since the protein metabolism of the nephritic patient is the same as that of the normal person, and since too little protein is more likely to be harmful than too much, the following volume is generally accepted: The daily protein intake should range from 0.75 to 1 gram per kilogram of body weight. Although 0.5 grams has proved enough to maintain nitrogen equilibrium in some cases, 0.75 to 1 gram assures an adequate mineral supply.

In addition to the regulation of protein, a low-calorie, high-carbohydrate diet will serve to reduce the protein metabolism without harming the patient. Adequate amounts of vitamin A, the B complex, C, and D must be given, and the administration of iron may be helpful.

If nitrogen retention is present, the protein may be more rigidly restricted for a week or ten days, but if nitrogen retention is absent, the standard amount of protein may be given. In nephrosis, where protein is lost in the urine, 1 gram of protein per kilogram of body weight is given, plus the average amount lost daily in the urine. From

125 to 150 grams may be given a day if the patient can tolerate it, because the protein provides building material.

Energy The number of calories needed by a nephritic patient is usually the same as for the same person in health, being determined by size and activity and, in the case of children, by age. However, where dyspnea is marked or the patient is restless, the energy requirement is increased. When edema is present it is somewhat lessened.

In acute nephritis, as in other acute diseases, some physicians hold that it is not necessary to meet the energy requirement, but in chronic cases, unless the patient is overweight, enough food must be given to prevent loss of weight and strength.

Salt content The normal kidney by means of its regulatory function preserves a constant concentration of salts in the blood and tissues. When this function is impaired, as in acute nephritis and in all cases of chronic nephritis with edema, salts accumulate in the blood (chloride retention), tending to increase its concentration. This is especially true of sodium chloride, which is consumed in so much larger amount than other minerals. To compensate for this, the body holds back water and edema results.

The control of water balance is dependent to a large extent upon the ability of the kidney to excrete salt. Sodium and chloride are filtered through the glomeruli, and the filtrate passes on into the proximal and distal convoluted tubules. In these structures, the regulation of the reabsorption or excretion of sodium and chloride takes place. When there is a disease of the epithelial cells in the proximal or in the distal convoluted tubules, salt excretion is commonly impaired. In such kidney disorders as chronic glomerulo-nephritis with secondary tubular damage, in lipoid nephrosis, and in the nephrotoxic kidney lesion which may occur during sulfonamide therapy, salt excretion is impaired, and an excessive retention of sodium and chloride in the blood may exist. Usually the retention of sodium and chloride is associated with edema, but not always.

Edema may be prevented in some cases by restricting the intake of salt. Salt intake may be limited to 2 or 3 grams daily by avoiding all salt-rich foods, preparing food without salt, and allowing no other addition of salt. However, if there is no necessity for such a rigid restriction, a moderate amount of salt may be used in cooking, bringing the total daily intake to 4, 5, or 6 grams.

It is generally agreed that, in all forms of nephritis, the salt naturally

present in food, plus a small amount added to otherwise unpalatable food, is all that should be allowed. More than this may cause edema, and less than this may not meet the requirements of the body. If the sodium-chloride level of the blood is normal, salt may be restricted rigidly; but, if the sodium chloride level has been reduced by vomiting or lack of appetite, salt may be administered until a normal level is reached.

The use of salt substitutes may also be harmful.

Fluid intake In the absence of edema, the intake of fluid is tempered according to desire, but excesses are avoided. Attempts to flush the kidney with large amounts of fluid run counter to the more modern treatment, which aims to relieve the kidney of much of its work and thereby to encourage healing. Flushing of fluids also adds a strain on the heart, and this is especially dangerous in the presence of hypertension or any heart disease.

In the presence of edema, the intake of fluid is limited. However, it is a mistake to reduce the fluid intake of the edematous patient under 1000 c.c. a day. Excessive restriction of water in the diet leads to inadequate urinary output; and, as the toxic substances of metabolism are dependent upon urinary output, they will be retained if the output is insufficient.

The acid-base balance Strongly acid urine, produced by the elimination of excess acid from acid-forming diets, is generally considered to be injurious to the kidneys and to bear some relation to the development and course of nephritis. Sansum, Blatherwick, and Smith state that when the urinary acidity is reduced by the administration of a base-forming diet, there is a fall in blood pressure, less shortness of breath, less dizziness, fewer headaches, and an improvement in the condition of the kidneys as shown by fewer casts and less albumin in the urine.[2] However, Murphy and Peters compared the high acid-ash diet and the high alkaline-ash diet in a series of cases of acute nephritis and found little or no difference in the two in the early stages of healing.

ACUTE NEPHRITIS

In acute nephritis associated with nitrogen retention and symptoms of uremia, a low-protein diet is recommended for a short time or until

[2] For acid- and base-forming qualities of common foods, see Table 3, page 671; and for suggested menus for base-forming diets see page 322.

a diuresis starts and the nitrogen retention decreases. Sometimes all food is withheld for a few days, especially in very severe cases where there is nausea with vomiting. The quantity of fluid to be given must be determined by the physician; it may be limited to very small amounts or perhaps to cracked ice. If the patient cannot tolerate fluids given orally, they must be given intravenously.

A milk diet, such as the Karell Diet, is often used, with increasing amounts of milk or the addition of cereals, bread, sweet butter, and fruits in convalescence. The salt content is usually kept to approximately 2 grams. However, in moderate or slight cases, 4 to 5 grams of salt and 1200 to 1600 c.c. of fluid may be given daily.

It is rarely necessary or desirable to keep up a strict Karell Diet for more than 3 or 4 days. Fruit juice is frequently a pleasing substitute for part of the milk. A mixed diet with ample calories and full mineral vitamin content but with salt and water restricted should soon be instituted.

THE KARELL MILK DIET

(Low Protein, Low Salt, Low Fluid, Low Calory)

First to Fourth Day: The "Strict Karell Diet" is given.

Feedings at 8 A.M., 12 Noon, 4 P.M., 8 P.M.

800 c.c. milk is given daily—200 c.c. milk at each feeding.

The milk may be given raw or boiled, warm or medium cold, according to taste.

No other liquid or food is given. Usually at the end of a week the diet is gradually increased because of its low caloric value but remains relatively low in salt and water throughout the entire "cure."

Approximate content—Calories, 550: Protein, 26 grams; carbohydrate, 40 grams; fat, 32 grams; salt, 1.2 grams; water, 697 or 700 c.c.

Fifth Day: The "Modified Karell Diet" is used on the fifth and succeeding days.

800 c.c. milk as on first day.

10 A.M. 1 soft-cooked egg.

6 P.M. 2 pieces dry toast.

Approximate content—Calories, 766: Protein, 37 grams; carbohydrate, 70 grams; fat, 38 grams; salt, 1.75 grams.

Sixth Day:

800 c.c. milk as on first day.
10 A.M. 1 soft-cooked egg, 2 pieces dry toast.
6 P.M. 1 soft-cooked egg, 2 pieces dry toast.

Approximate content—Calories, 982: Protein, 48 grams; carbohydrate, 100 grams; fat, 43 grams; salt, 2.2 grams.

Seventh to Twelfth Days:

800 c.c. milk as on first day.
12 Noon. 1 egg, 50 grams toast, 100 grams cooked rice (30 grams raw), 100 grams (1 serving) vegetables—asparagus, celery, cauliflower, carrots.

Approximate content—Calories, 905: Protein, 41 grams; carbohydrate, 100 grams; fat, 38 grams; salt, 2.41 grams.

MODIFIED KARELL DIET[3]

The following modified diet is suggested when the patient is opposed to the Karell Diet, either because of thirst and the monotony of the food or occasionally because of the dislike of milk. This modified diet is arranged to include a wider variety of food and to allow some extra water without increasing the total fluid intake or the food value and without appreciable change in the salt content. The foods selected for this modified Karell Diet are prepared without adding salt, the food being weighed and served as follows:

Breakfast:	GRAMS
Bread (toast)	10
Ten per cent fruit (orange)	100
Sugar	5
Egg, 1	

Dinner:	GRAMS
Bread	10
Cream soup (cream of celery)	150
Butter	5

Supper:	GRAMS
Bread	10
Milk	200
Butter	10
Egg, 1	

Calories, 645: Protein, 26 grams; fat, 39 grams; carbohydrate, 48 grams.

[3] Edwin G. Bannick, M.D., and Florence H. Smith, B.S., Mayo Clinic, Rochester, Minn., "The Karell Diet in the Treatment of Cardiac Dropsy," in *Journal of the American Dietetic Association,* Vol. 2, p. 246.

A comparison of the two diets according to Sherman's tabulation shows but slight variations in the composition. The Modified Karell Diet, however, contains less water than the Karell Diet. This diet allows the patient water or pellets of ice to make the total intake of water and food up to the 700 c.c. found in the Karell Diet.

CHRONIC NEPHRITIS WITH EDEMA

This condition calls for a diet low in fluid and mineral content. The usual two grams of sodium chloride contained in the salt-poor diet may be still further restricted. The total fluid intake is limited as a rule to from 800 to 1000 c.c., which with water of the food provides a daily intake of from 1400 to 1600 c.c. of water.

The patient is started on a diet sufficient for his basal metabolic requirement, say 1500 calories, with 40 grams of protein. With subsequent study of the patient, this is increased, largely in the form of protein and total calories, with little change in the water and mineral content. The standard diets reach a protein content of 50 grams with 2500 calories.

If there is nephrosis, or even nephritis with a predominant nephrotic component, the diet should furnish from 100 to 150 grams of protein for 1 or 2 weeks, in order to replace if possible the large amount lost through the urine. At the end of the second week the patient may be given 1 gram of protein per kilogram of body weight, plus the amount lost daily in the urine.

SUGGESTED MENUS LOW IN WATER AND IN MINERAL CONTENT [4]

MENU NO. I

Breakfast:	GRAMS	Dinner:	GRAMS
Ten per cent fruit	100	Five per cent vegetables	100
Egg, 1		Rice	100
Toast	20	Bananas	100
Butter	10	Meat	45
Sugar	5	Mayonnaise	15
		Bread	20
		Butter	15
		Sugar	5

[4] N. M. Keith, F. H. Smith, and M. Whelan, Mayo Clinic, Rochester, Minn.

Supper:	GRAMS	Supper (continued):	GRAMS
Five per cent vegetables	100	Bread	20
Macaroni	100	Butter	15
Fifteen per cent fruit	100	Egg, 1	
Ten per cent fruit	100	Mayonnaise	15
		Sugar	5

This diet furnishes—Calories, 1515: carbohydrates, 148 grams; protein, 40 grams; fat, 80 grams; water, 809 c.c.; sodium, 0.507 gram; potassium, 1.625 grams; calcium, 0.225 gram; magnesium, 0.196 gram; chlorine, 0.688 gram; phosphorus, 0.657 gram; sulphur, 0.562 gram; iron, 0.009 gram.

MENU NO. II

Breakfast:	GRAMS	Dinner (continued):	GRAMS
Ten per cent fruit	100	Mayonnaise	30
Bread	30	Sugar	10
Butter	20	Jelly	30
Egg, 1		Opera sticks	35
Sugar	10		
Jelly	35	Supper:	
		Five per cent vegetables	100
		Grapefruit	100
Dinner:		Apple	100
Five per cent vegetables	100	Potato	100
Banana	100	Bread	35
Potato	100	Butter	25
Bread	35	Eggs, 2	
Butter	25	Mayonnaise	30
Meat	85	Sugar	10
Forty per cent cream	50	Jelly	35

This diet furnishes—Calories, 3005: carbohydrates, 301 grams; protein, 60 grams; fat, 164 grams; water, 132 c.c.; sodium, 0.842 gram; potassium, 2.848 grams; calcium, 0.280 gram; magnesium, 0.206 gram; chlorine, 0.870 gram; phosphorus, 0.981 gram; sulphur, 0.814 gram; iron, 0.157 gram.

CHRONIC NEPHRITIS WITHOUT EDEMA

In all chronic conditions the diet prescribed will have to be adhered to for months or even years and must therefore supply not only sufficient calories and protein, but also all of the needed minerals and vitamins as well as residue or bulk to preserve normal intestinal tone. Fortunately fruits, vegetables, milk, cream, and butter, which are so

generally included in nephritic diets, are valuable sources of these dietary essentials. No rigidly restricted dietary regime can be safely prescribed which does not take account of all the components of a well-balanced normal diet.

As a rule the protein content of the diet is kept low, though never less than 40 grams per day, since the body needs at least this amount to replace catabolized tissue protein. A minimum of 60 grams should be in order except while one is trying to reduce nitrogen retention in the blood. Peters advocates feeding 1 gram of protein per kilogram of normal, not actual, weight if the patient is undernourished, giving at the same time enough fat and carbohydrate to restore and maintain a normal state of nutrition.

Water is usually not limited, and with nitrogen retention some physicians force fluids to wash out the toxic products. One should be careful, however, to avoid decompensating the heart by excessive fluid.

Most medical authorities advise some restriction of salt, differing only in the degree of restriction.

SUGGESTED DIETS FOR CHRONIC NEPHRITIS WITHOUT EDEMA

DIET NO. 1

Calories, 1600 to 2000: Protein, appr. 40 grams.

Breakfast:
- Orange juice, 1 glass
- Cream of wheat, 4 tbsp.
- Toast, thin slice
- Orange marmalade, unlimited
- Peaches, 1 whole
- Cream, ¼ cup
- Butter, unlimited

Luncheon:
- Vegetable soup, 1 bowl
- Spinach, 3 tbsp.
- Baked potato, 1
- Bread, 1 thin slice
- Butter, unlimited

Luncheon (continued):
- Milk, 1 glass
- Asparagus salad, 1 medium serving with French dressing
- Prune whip, 1 serving

Dinner:
- Baked tomato, 1
- Fruit salad, 1 serving
- Bread, 1 thin slice
- Rice pudding, 4 tbsp.
- String beans, 3 tbsp.
- Cottage cheese, 1½ tbsp.
- Butter, unlimited

DIET NO. II

Calories, 2000: Protein, appr. 70 grams.

Breakfast:
- Grapefruit juice, 1 glass
- Oatmeal, 4 tbsp.
- Toast, 1 slice
- Butter, unlimited
- Orange, 1 medium
- Egg, 1
- Cream, ¼ cup

Luncheon:
- Cauliflower, 3 tbsp.
- Cottage cheese, 3 tbsp.
- Bread, 1 thin slice
- Prune whip, 1 serving

Luncheon (continued):
- String beans, 3 tbsp.
- Waldorf salad, 1 average serving
- Butter, unlimited

Dinner:
- Baked potato, 1
- Squash, 1 serving
- Milk, 1 glass
- Bread, 1 slice
- Lamb chops, 2
- Tomato salad, 1 serving
- Rice pudding, 1 serving
- Butter, unlimited

KEMPNER'S RICE DIET

Recently the rice diet, originated by Walter Kempner, has been used with favorable results in the treatment of acute and chronic nephritis and hypertension. The diet is monotonous; it must be continued over a long period of time to obtain good results; and it is reported to be worthless if modified in any way. However, the basic diet may be modified after a time, and beneficial results justify its used. The original diet consists only of rice, fruit, and fruit juices, and sugar, supplemented with vitamins and iron.

MODIFIED RICE DIET

This diet is composed only of the foods listed below. No other food is eaten or used in the preparation of the foods allowed, and no salt is used in cooking or added to the food. Vitamins and iron supplement the diet. The arrangement of the food may be changed, but all of the foods listed must be taken in the proper amounts in 24 hours. Four tablespoons of sugar are allowed each day.

MENU

Breakfast:

Puffed Rice, 1 cup
Banana, 1 6-inch
Milk, ½ cup
Part of the day's sugar
Whole-wheat bread, 1 slice, with 1 tbsp. jelly
Grapefruit juice, 1 cup, with sugar

Midmorning:

Lemonade—2 tbsp. lemon juice, water, and sugar

Luncheon:

Cooked rice, ½ cup
Whole-wheat bread, 1 slice, with 1 tbsp. jelly
Orange, 1

Fruits, 1 cup of the following:

Apple
Apricot
Blueberries
Cherries, sweet
Grapes
Peaches
Pears
Pineapple
Plum
Prunes
Raspberries

Vegetables, raw or cooked, 1 cup of 1 of the following:

Any greens, as spinach, chard, endive, etc.
Broccoli
Celery
Squash
Tomato

Grape juice, 1 cup

Midafternoon:

Orange juice, 1 cup

Dinner:

Cooked rice, ½ cup
Cooked vegetables, any of these listed above, ½ cup
Raw vegetables, any of those listed above, ½ cup
Whole-wheat bread, 1 slice, with 1 tbsp. jelly
Fruits, any of those listed above, ¾ cup
Grapefruit juice, 1 cup, with sugar

Evening:

Pineapple juice, 1 cup

LACTO-FARINACEOUS DIET

This diet is often useful in cases of acute and chronic nephritis. The following foods are allowed: Milk, kumyss, zoolak, tea as served, coffee as served, graham bread, white bread, French rolls, toast, milk toast, cream toast, baked potatoes, plain crackers, spaghetti, cornstarch pudding, rice, cornmeal, oatmeal, arrowroot, barley, farina, hominy, cream of wheat, sago, rennet-custard, ice cream without eggs, puddings, milk and cereal.

MENU

For 2400 Calories a Day: Approximate value—protein 80 grams; fat, 100 grams; carbohydrates, 295 grams.

	MEASURE	OUNCES	GRAMS	CALORIES
7:00 A.M.				
Milk	1 cup	8.0	240	166
8:00 A.M.				
Farina	⅔ cup	6.0	180	100
Milk on cereal	½ cup	4.0	120	83
Toast	2 slices	1.3	30	100
Coffee	...	...	...	...
Cream, 20%	2 tbsp.	1.0	30	62
10:00 A.M.				
Rennet-custard	1 cup	8.0	250	280
Graham crackers	2	0.6	20	80
Noon				
Baked potato	1	5.2	120	100
Hot milk	2 tbsp.	1.4	40	28
Lettuce sandwich				
Bread	2 slices	1.3	40	100
Lettuce heart	2 small leaves	0.6	30	6
Mayonnaise	1 tbsp.	0.5	14	101
Rice pudding	½ cup	4.2	150	270
Milk	1 cup	8.0	240	166
3:00 P.M.				
Kumyss	1 cup	8.0	244	127
Soda crackers	1	0.2	7	25
6:00 P.M.				
Milk toast				
Graham bread	2 slices	2.1	60	158
Milk	1 cup	8.0	240	166
Vanilla ice cream	¾ cup	3.0	120	300
				2418

NEPHROSIS

In Nephrosis or Degenerative Bright's Disease Epstein [5] recommends a diet very high in protein. Peters [6] advocates an allowance of 1 gram of protein per kilogram of normal weight, with an addition of 10 to 20 grams of protein to make good the loss of protein in albuminuria. He limits salt to 2 grams daily or less as long as edema persists, increasing this up to 5 grams when edema has disappeared. Keith, Smith, and Whelan advise a low-salt, low-fluid diet containing not less than 40 grams of protein and 1500 calories. This is the basal food requirement of the average individual. This is supplemented by additional foods to meet the individual patient's need for calories and ability to excrete the end-products of protein metabolism, still keeping the water and mineral content low.

McLESTER'S HIGH-PROTEIN MENUS

(2008 Calories)

	CARB. (*grams*)	PRO. (*grams*)	FAT (*grams*)
Breakfast:			
½ medium grapefruit	20	1	1
Average portion broiled mackerel *with*		22	5
Average portion sweetbreads or brains		32	
Lemon			
1 bran muffin	8	2	2
1 cup coffee with 2 tsp. sugar	20		
	48	57	8
Dinner:			
½ dozen oysters on half shell with lemon	3	5	1
Large helping turkey white meat		35	5
1 medium-sized baked potato	32	4	
3 heaping tbsp. green peas	13	6	3
Average portion lettuce salad with vinegar	2		
Fruit cup, ½ each orange and grapefruit, and 2 lady fingers	38	3	2
1 average slice whole-wheat bread	20	4	
½ cup black coffee			
	108	57	11

[5] A. A. Epstein, "Further Observations on the Nature and Treatment of Chronic Nephrosis," in *American Journal of Medical Science,* Vol. 163, p. 157.

[6] J. P. Peters, "The Principles of Diet Control in Nephritis with Especial Reference to Protein and Salt Restriction," in *Journal of the American Dietetics Association,* Vol. 2, p. 137.

upper:	CARB. (grams)	PRO. (grams)	FAT (grams)
Small cup homemade chicken soup with 2 Uneeda biscuits	6	14	1
Average portion broiled tenderloin steak—no fat—		24	1
served with 6 panned oysters	3	5	1
1 tsp. butter			
2 heaping tbsp. lima beans	23	6	1
1 average slice whole-wheat bread	20	4	
1 baked banana with lemon juice	32	2	1
and 1 tsp. sugar	10		
1 cup tea with lemon and 2 tsp. sugar	20		
	114	55	9
Total	270	169	28

PYELITIS AND PYELONEPHROSIS

In these diseases diets suitable for fevers are usually given: base-forming diets, consisting largely of milk, cream, fruits, and vegetables, with the addition of cereals or cereal gruels and moderate amounts of eggs, bread, butter, and sugar. Tender meat and fish are given in convalescence. Salt is usually limited to about 2 grams, and all other condiments are avoided. Fluids are used liberally.

NEPHROSCLEROSIS

The sclerotic type of nephritis is a vascular disease.[7] Impairment of the kidney function appears in the later stages. McLester says:

"The diet in nephrosclerosis should be balanced and not unduly restricted. The caloric intake should be reasonably small but nonetheless sufficient not only to meet the patient's minimal needs, but also to maintain him in the highest degree of strength and vigor for the greatest number of years.

"Carbohydrate should furnish more than half the calories. A part of the fat should be in the form of butter and cream. Milk should always be included. An abundance of vegetables and fruits should be taken, and salt should be permitted within reasonable limits." [8]

[7] See the section on Arterial Hypertension.

[8] James S. McLester, *Nutrition and Diet in Health and Disease,* 4th ed., Philadelphia: W. B. Saunders Co., 1944, p. 507. By permission of the publishers.

SELECTION OF FOOD FOR THE NEPHRITIC PATIENT

The patient is first placed on a diet calculated to meet the requirements of the average individual at rest in bed. This diet contains approximately 40 to 60 grams of protein, 1500 calories, between 1200 and 1400 grams of water in the food, and 7 to 8 grams of salt. *Exact quantities of salt and water are prescribed by the physician.*

Salt It is estimated that there are 2 to 3 grams of salt naturally in the food, and approximately 5 grams are added during preparation. No extra salt and pepper is allowed on the tray. No other seasonings or condiments are used except a small amount of vinegar or lemon juice.

Fluids Additional fluids up to 1200 c.c. are allowed unless otherwise ordered.

Protein As the caloric requirement and the ability of the patient to use protein food is determined, the diet is adjusted by the physician to meet the patient's requirements. Protein is added in any form desired and the calories adjusted by the addition or subtraction of carbohydrate or fat.

Foods allowed

Vegetables The importance of vegetables in the diet cannot be overemphasized. They may be either fresh or canned.

Fruit Fresh or canned is often advised instead of desserts. Fruit is particularly helpful in combating hunger when the caloric intake is low and in cases of constipation when additional bulk is required.

Bread Choice and quantity unlimited.

Butter and butter substitutes May be used as allowed in the diet. If the food is to be served without salt, the salt may be washed from the butter or sweet butter used.

Eggs Contain protein and should be used as specified on the diet order.

Bacon May be used by the nephritic patient unless the diet is ordered salt-free.

Red meats As far as is known, red meats are no more harmful than white meats if equal amounts are used. It is the quantity of protein food rather than the quality that is limited.

Cream Twenty per cent is sold on the market as coffee cream and 40 per cent as whipping or heavy cream.

Milk Is a valuable food for the young and should be used in all diets when the protein and fluids allowed are sufficient.

Cereal Is a valuable food when the amount of carbohydrate in the diet exceeds the amount necessary for vegetables, fruit, and cream.

Beverages If tea, coffee, and cocoa are prohibited, coffee substitutes may be used.

Mayonnaise dressing Made by any standard recipe, mayonnaise is approximately 85 per cent fat. The traces of carbohydrate and protein in this may be disregarded. Either lemon or vinegar may be used in making salad dressing.

Foods to avoid Meat soups, broth, and gravy should be omitted, as they contain meat extractives in concentrated form.

O'HARE'S NEPHRITIC DIET [9]

The following regime, which is accurate enough for most hospitals, has proved especially useful for the management of nephritis in the home. The foods are grouped according to their protein content, which is indicated by "points." The physician prescribes the daily protein allowance in terms of the total "score" in points, instead of grams.

Any combination of the foods listed below may be selected.

Foods not listed below must not be taken.

In Groups I and II there is a restriction in the total amount.

The foods in these groups must be served in full or half portions.

A full portion in Group I counts 1.

A full portion in Group II counts 2.

In Group III the quantity of each is not restricted, although you are urged to use discretion.

Points on recipes to count as indicated.

Your total score for the day should be . . . . —POINTS.
Your total amount of fluid should be . . . . —PINTS.

Do not add salt or spices to the food after it has been cooked.
All tablespoons are measured "rounded."

[9] Courtesy of the Peter Bent Brigham Hospital, Boston, Mass., 1939.

GROUP I[10]

(Each full portion counts 1)

	FULL PORTION	VEGETABLES, ETC.	FULL PORTION
Bread, white	1 av. slice	Baked beans	1 tbsp.
Bread, graham	1 av. slice	Lima beans	1½ tbsp.
Uneeda biscuit	5 crackers	Potato, creamed	1 tbsp.
Shredded wheat	1 biscuit	Potato, mashed	1½ tbsp.
Graham crackers	5 crackers	Potato, baked	1½ med.
		Potato, boiled	1½ med.
Cereals, etc.		Canned corn	2½ tbsp.
Oatmeal	2 tbsp.	Green peas	2 tbsp.
Boiled rice	3 tbsp.	Beets	5 tbsp.
Cornmeal mush	4 tbsp.	Spinach	4 tbsp.
Cream of wheat	6 tbsp.		
Farina	6 tbsp.	Bananas	2 large
Macaroni	4½ tbsp.	Cream, heavy	⅔ cup

GROUP II[11]

(Each full portion counts 2)

	FULL PORTION	FISH	FULL PORTION
Milk	1 glass	Cod, boiled	1"x1"x1½"
Egg	1 egg	Haddock, boiled	1"x1"x1½"
Eggs, scrambled	1½ tbsp.	Halibut, boiled	1"x1"x1½"
Flour, sifted	⅔ cup	Mackerel, boiled	1"x1"x1½"
		Salmon, boiled	1"x1"x1½"
Meats		Smelt	½"x1"x3"
Lamb chop, broiled	⅔ chop	Oysters	7 oysters
Lamb, roast	3"x2½"x¼"	Crabmeat, canned	2 tbsp.
Beef, roast	3"x2"x¼"	Salmon, canned	1½ tbsp.
Beef steak, broiled	2"x1"x1"	Shrimp, canned	6 small
Chicken, roast	3"x3"x⅛"		

GROUP III

NO RESTRICTIONS

(Although urged to use with discretion)

VEGETABLES

Asparagus	Mushrooms
Cabbage	Onions
Carrots	Squash
Cauliflower	String beans
Celery	Tomatoes, cooked
Cucumbers	Tomatoes, fresh
Lettuce	Turnips

10 In Group I, each full portion contains approximately 4 grams of protein.
11 In Group II, each full portion contains approximately 8 grams of protein.

FRUITS

Apple	Oranges
Apricot	Peaches
Blueberries	Pears
Cherries	Pineapple
Cranberries	Plums
Grapefruit	Prunes
Grapes	Raspberries
Lemons	Strawberries
Muskmelon	Watermelon

MISCELLANEOUS

Arrowroot	Olive oil
Arrowroot cookies, 3 per day	Post toasties
Butter	Sugar
Cornstarch	Syrup
Dates, 4 per day	Tapioca
Honey	Candy
Maple sugar	

RECIPES FOR USE IN NEPHRITIC DIETS [12]

Soups

VEGETABLE SOUP (0 POINTS)

2 tbsp. onions, chopped
2 tbsp. carrots, chopped
2 tbsp. turnips, chopped
3 tbsp. celery, chopped
2 tbsp. butter
1 pint water

Cook all the vegetables in butter for 3 minutes. Add the water and boil 45 minutes, or until vegetables are soft.

Calories, 245: Protein, 2 grams; fat, 22 grams; carbohydrate, 10 grams.

CREAMED VEGETABLE SOUP (1 POINT)

½ cup strained vegetables from Group I (p. 340)
½ cup milk

Thicken with 1 or 2 tsp. cornstarch moistened in 1 tbsp. cold water.

[12] Courtesy of the Peter Bent Brigham Hospital, Boston, Mass., 1939.

Cake

CUP CAKES (2 = 1 POINT)

3 tbsp. butter
¼ cup (scant) sugar
½ egg
¼ cup milk
⅔ cup flour
1½ tsp. baking powder
⅓ tsp. vanilla

Make into 6 cakes.

Calories, 877: Protein, 15 grams; fat, 39 grams; carbohydrate, 117 grams.

SHORTCAKE (2 = 1 POINT)

1⅕ cups sifted flour
2 tbsp. lard or butter, salt-free
2 tsp. baking powder
½ cup (scant) milk

Mix as biscuits and make into 8 biscuits. No salt added to recipe.

Calories, 625: Protein, 21 grams; fat, 6 grams; carbohydrate, 121 grams.

Desserts

INDIVIDUAL PIE (1 POINT)

⅓ cup flour
1⅓ tbsp. lard
⅛ tsp. baking powder
Ice water to make a stiff dough

This may be made with any fruit from Group III (pp. 340-341) for filling. Cornstarch instead of flour may be used for thickening.

Calories: 275: Protein, 5 grams; fat, 14 grams; carbohydrate, 32 grams.

BLANC MANGE (1 POINT)

2½ tsp. cornstarch
¾ tbsp. sugar
½ cup milk
2 tbsp. cold water
¼ tsp. vanilla

Heat the milk in a double boiler; add the cornstarch moistened in cold water, and sugar. Cook until well thickened, add vanilla, and chill. Fruit from Group III (pp. 340-341) may be added.

Calories, 160: Protein, 4 grams; fat, 5 grams; carbohydrate, 25 grams.

BAVARIAN CREAM (1½ POINTS)

1 tsp. granulated gelatin
1½ tbsp. cold water
¼ cup cream, whipped
1 tsp. lemon juice
2 tsp. sugar
¼ canned peach chopped fine
¼ cup boiling water

Soak the gelatin in cold water, dissolve it in boiling water, add lemon

uice and sugar, and chill until it is the consistency of heavy molasses. Stir n peach pulp or other fruit from Group III (pp. 340-341) and fold in the whipped cream. Chill.

Calories, 275: Protein, 4 grams; fat, 23 grams; carbohydrate, 14 grams.

BAKED CUSTARD (2 POINTS)

½ cup milk
Flavor with caramel or vanilla
½ egg
¾ tablespoon sugar

Beat the egg slightly, add the milk, sugar, and flavoring. Pour into a mold and bake in a moderate oven with the mold standing in a pan of water. This custard may be steamed or boiled.

Calories, 160: Protein, 7 grams; fat, 8 grams; carbohydrate, 16 grams.

RICE PUDDING (2 POINTS)

¼ cup boiled rice
¼ cup milk
½ egg
2 tsp. sugar
2 tsp. raisins

To the slightly beaten egg add the milk and other ingredients. Bake in moderate oven until lightly browned.

Calories, 185: Protein, 6 grams; fat, 5 grams; carbohydrate, 29 grams.

TAPIOCA CREAM (1 POINT)

¼ cup milk
1 tbsp. (scant) tapioca soaked overnight in 3 tbsp. cold water
¼ tsp. vanilla
⅓ egg
1 tbsp. sugar

Drain the tapioca, mix with sugar, and add slowly to the milk, which has been scalded in a double boiler. Cook till the tapioca is clear. Stir in gradually the beaten ⅓ egg yolk and fold in lightly the beaten ⅓ white.

Calories, 168: Protein, 4 grams; fat, 4 grams; carbohydrate, 29 grams.

PINEAPPLE MOUSSE (½ POINT)

⅓ cup cream, heavy
1½ tbsp. shredded pineapple
½ tsp. lemon juice
1 tbsp. sugar

Whip the cream, then fold in the other ingredients, previously mixed. Pour into a freezing tray, set the temperature control to the coldest point, and freeze 3 to 4 hours without stirring.

Calories, 375: Protein, 2 grams; fat, 30 grams; carbohydrate, 24 grams.

ICE CREAM (1 POINT)

Two-thirds cup of cream flavored as desired with fruit from Group III (pp. 340-341) and sugar.

WATER ICE (0 POINTS)

Any combination of fruit from Group III (pp. 340-341), sweetened and frozen.

Salad Dressing

NEPHRITIC DRESSING (O POINTS)

(As used on salad, does not count any points)

1 egg yolk
1½ cups salad oil
4 or 5 tsp. lemon juice
1 tsp. sugar

Beat the egg yolk, add 1 or 2 drops of lemon juice. Then drop by drop beat in the salad oil. Thin down with the lemon juice, adding only part of it at a time. Add the sugar last.

Calories, 2490: Protein, 3 grams; fat, 272 grams; carbohydrate, 8 grams.

Bread

LOW-SALT WHITE BREAD [13]

	AMT. (*gm.*)	PRO. (*gm.*)	FAT (*gm.*)	CARB. (*gm.*)	SALT (*gm.*)	CAL-ORIES
1 cup boiling water	240	..	..	...	...	...
1 tbsp. lard	15	..	15	...	...	135
Sugar, more if desired	15	..	..	15	...	60
¼ cake Fleischmann's yeast						
Flour	250	27	2	187	305	886
Baked weight	400	27	17	202	305	1081
100 grams	...	7	4	50	76	270

Put the lard and sugar in a bowl, add the boiling water, and when lukewarm add the yeast dissolved in a little cold water. Stir in 100 grams of flour and allow the mixture to stand in a warm place for 1 hour. Add 150 grams of flour and knead. Use enough flour to knead the bread smooth. Put in a bowl and allow to stand in a warm place until it has risen to twice its bulk. Knead down and put into a greased bread pan, allow to rise again, and bake in a medium oven.

[13] Courtesy of the Stanford University Hospital, San Francisco, California.

LOW-SALT WHOLE-WHEAT BREAD [13]

	AMT. (gm.)	PRO. (gm.)	FAT (gm.)	CARB. (gm.)	SALT (gm.)	CALORIES
1 cup boiling water	240	..	..	...	...	...
1 tbsp. lard	15	..	15	...	...	135
Sugar	15	..	..	15	...	60
¼ cake Fleischmann's yeast						
White flour	100	11	1	76	122	354
Whole-wheat flour	100	13	2	72	112	359
Baked weight	325	24	18	163	234	908
100 grams	...	7	5	50	72	280

Follow directions for white bread, above.

SOYBEAN MUFFINS

- 1½ cup soybean meal
- 2 tsp. baking powder
- ¼ tsp. salt.
- 2 eggs
- 1 cup milk
- 1 tbsp. butter, melted
- ¼ cup walnuts
- ¼ cup raisins

Mix the dry ingredients. Add the beaten eggs and milk to the flour mixture and bake in a moderate oven 25 to 30 minutes. This recipe will make 8 muffins or 1 loaf.

Value of one muffin: Calories, 191: Carbohydrate, 10 grams; protein, 13 grams; fat, 11 grams; salt, 0.015 gram.

PLAIN BREAKFAST MUFFINS [14]

(Six average servings, cooked weight)

	AMT. (gm.)	PRO. (gm.)	FAT (gm.)	CARB. (gm.)	CALORIES
1 cup white flour	100	11	1	76	354
1 tbsp. sugar	15	..	.	15	60
½ cup cream, 20%	125	4	25	5	260
1 egg	50	7	6	..	79
1 tsp. baking powder	5	..	..	..	...
Total		22	32	96	753
Per serving		4	5	16	125

Beat the egg, add the sugar and cream, then the flour and baking powder mixed and sifted. Bake for 20 minutes at 450° F.

[14] The Scripps Metabolic Clinic, La Jolla, Cal., *Compilation of Diets*. Courtesy of the California State Dietetic Association.

DATE MUFFINS [15]

	AMT. (gm.)	PRO. (gm.)	FAT (gm.)	CARB. (gm.)	CALORIES
1 cup flour	100	11	1	76	354
¼ cup sugar	50	..	..	50	200
¾ cup cream, 20%	180	5	36	7	375
1 egg	50	7	6	..	79
6 dates	40	1	0	30	124
2 tsp. baking powder	10	..	..	..	...
Total		24	43	163	1132
Per serving		3	5	20	142

Beat the egg, add the sugar, dates, and cream, then the flour and baking powder mixed and sifted. Bake for 20 minutes at 450° F.

QUESTIONS FOR STUDY

NEPHRITIS

1. What is nephritis?
2. What is the difference between nephrosis and nephritis?
3. What is edema? To what is it due?
4. In what ways may kidney function be affected?
5. How is the normal diet modified for each of these conditions?
6. Describe the Karerll Diet.
7. What foods are used in the Modified Karell Diet?
8. Explain the terms, "acid-forming" and "base-forming" diets. Name an acid-forming food; a base-forming food; a neutral-ash food.
9. What is the objection to acid-forming diets?
10. Why is protein restricted in nephritic diets?
11. Why is a protein-free diet suitable only for brief periods?
12. What is the normal dietary standard for protein?
13. What quantities of protein are suggested for nephritic diets?
14. Name five salt-rich and five salt-poor foods.
15. Plan a day's menu which will furnish approximately two grams of salt.
16. Why should meat soups be avoided in nephritic diets?
17. List the condiments which should not be used in nephritic diets.

[15] Courtesy of the Stanford University Hospital, San Francisco, California.

18.

GENERAL PRINCIPLES OF DIET IN DISEASES OF THE NERVOUS SYSTEM[1]

The importance of diet in this group of diseases is becoming increasingly apparent as knowledge of the underlying causes of neuropsychiatric disorders is being accumulated. More and more evidence is being offered of the fundamental role diet plays in the origin of these diseases, as well as the value of proper dietary habits in lessening the severity and retarding the progress of the disease. Work is now in progress in many laboratories and hospitals which will further clarify these factors, but even now certain food factors are known to have definite influence in many neuropsychiatric conditions. Co-operation between the physician and the dietitian can be of great benefit to the patient in this as in so many other fields.

Neurological diseases are often chronic, persisting over periods of 10 to 20 years, gradually incapacitating patients and responding little to the therapy now available. Until the specific treatment of such diseases as multiple sclerosis, amyotrophic lateral sclerosis, periodic paralysis, etc., becomes available, the dietetic management of these cases will remain as important as any single factor the physician can offer. Proper diet can prevent the distressing gastro-intestinal symptoms experienced by so many neurasthenics and aid in shortening the duration of delirium tremens. Dietary management of epilepsy has long been known as a valuable method of decreasing the frequency of convulsions. It has long been suspected that dietary factors are related to the susceptibility to poliomyelitis, but until more experimental data are assembled no definite statements can be made. Diet is a valuable therapeutic measure in Meniere's Syndrome, and experience has shown that regulation of food intake can be of great help to these patients. The dietitian is also a valuable ally in the care of patients with "surgical" diseases of the nervous system: tumors of the brain and spinal cord.

[1] This chapter was prepared by Dr. Irma H. Gross, formerly resident neurologist, Mt. Sinai Hospital, New York City; now on the staff of the New York State Psychiatric Institute and Hospital.

TUMORS OF THE BRAIN

Patients who have tumors of the brain present special dietetic problems. Because the skull is a rigidly closed, bony cavity, the growth of the tumor causes an increase in the intracranial pressure which may prove fatal if it is not reduced. If the tumor is one which can be removed, surgery is undertaken as soon as the diagnosis is made; but in some cases it is not removable and X-ray treatment is indicated. This is a slow method, and during the early part of the treatment it is essential that the patient be placed on a rigid dehydrating regimen so that brain edema will be kept at a minimum and intracranial pressure thereby reduced to some extent. Dehydrating drugs are prescribed by the physician (50 per cent glucose solution intravenously; 50 per cent magnesium sulphate by rectum; purine diuretics intramuscularly, etc.) but it is also of importance that the diet be as nearly salt-free as possible and low in actual fluid content. Soups, beverages, watery fruits and vegetables, highly seasoned foods, and salt must be reduced to the absolute minimum.

Another dietary complication of the X-ray treatment of brain tumors is the extreme anorexia that frequently occurs. Trays must be prepared as attractively as possible and foods selected with a maximum of imagination to tempt these patients into eating adequate meals.

UNCONSCIOUSNESS

Diseases of the nervous system often manifest themselves in temporary unconsciousness. When this persists for days or weeks, as it may in patients with postconvulsive stupor, intracranial hemorrhage, cerebrovascular accidents (strokes) etc., it is impossible to maintain the nutritional status adequately with intravenous feeding; and it is necessary to give high-calorie fluids by stomach tube. These should include milk, eggs, sugar, and powdered vitamin concentrates. By feeding 150 to 250 c.c. of this mixture every 4 hours daily, these patients can be carried through the period of unconsciousness successfully. This type of feeding problem often arises, too, in psychiatric cases when patients refuse to eat voluntarily but can be maintained in a good state of nutrition indefinitely by stomach-tube feedings.

SPINAL-CORD TUMOR OR DEGENERATIVE DISEASE

The problem of constipation is of great importance in patients with spinal-cord disease, since the nerves concerned in the emptying of the rectum all take origin from the cord. Spinal-cord tumors or degenerative disease of parts of the cord (combined degeneration of pernicious anemia, multiple sclerosis, amyotrophic lateral sclerosis) will cause disturbances of bowel function—usually progressive constipation. The doctor will prescribe mineral oil and frequent enemas or cathartics, but the diet must also be carefully regulated. Fruits, vegetables, bran cereals, etc. (roughage and bulk foods), are of great value in preventing impaction and stimulating bowel movement. (See pages 220-223 for special constipation diets.)

EPILEPSY

By epilepsy we mean a sudden loss of consciousness with a convulsion and complete amnesia for the attack. Most epileptics have their first convulsion at about the time of puberty. The average epileptic can be kept almost completely free of convulsions by continuous drug therapy with phenobarbital and dilantin, either alone or combined in various proportions. However, diet has been shown to exert a considerable influence on the incidence of convulsions, and every epileptic should follow certain general dietary rules. He should avoid alcohol, coffee, spices, salty foods; and should eat frequent small meals rather than one or two heavy ones. A salt-poor diet used to be recommended, but this is of value only to patients who are being treated with bromides. Since bromides are seldom used now in the treatment of epilepsy, the salt-poor diet is rarely advised.

Ketogenic diets have been widely used in the treatment of epilepsy, as it has long been known that they produce acidosis, and that this acidosis seems to lessen the frequency of convulsions. The diet consists of a large amount of fat, with carbohydrate and protein reduced to a minimum. The diet can be successful only if acetone and diacetic acid appear in the urine constantly. This is difficult to maintain. The intake of food must be controlled so that the number of grams of fat ingested must always equal 3 or 4 times the number of grams of carbohydrate plus protein (3:1 or 4:1 ratio). Such a diet is difficult to enforce. It requires intelligent co-operation on the part of the patient and the patient's family. It is far simpler to control epilepsy with specific anti-

convulsant medication; and, since we now have two effective drugs at our disposal (phenobarbital and dilantin), it is found necessary to resort to ketogenic diets only in those rare patients who show an idiosyncrasy to the drugs.

NEURASTHENIA

The neurasthenic patient is a physically healthy person who feels sick all the time. He complains of weakness, easy fatiguability, irritability, headaches, flushes and sweats, palpitations, and a host of other symptoms referable to every organ in his body, without any objective evidence of disease ever to be found. Treatment with medicines is usually unsuccessful, and psychotherapy is the only valid approach. Even this is a long, difficult, and not always successful treatment for neurasthenia.

Since these patients are usually inadequate to cope with the normal problems of life, "rest-cures" are often recommended. These aim to simplify and standardize the patient's life to the point where all problems and opportunities for mental conflict are removed. Unfortunately, this does not aid the patient in adjusting to his own environment, and upon the completion of the rest cure and his return home the old symptoms often reappear.

None the less, the rest cure with regulation of diet is widely used in the treatment of neurasthenia. Of the many regimens which have been devised, the original and best known is the Weir-Mitchell rest cure. The patient is placed in an environment conducive to complete physical and mental relaxation—preferably away from home—and kept in bed for 4 to 8 weeks. For a few days he is given nothing but milk. Mitchell found that most neurasthenics would be cured of their various gastrointestinal symptoms by this means. He gave 4 ounces of skimmed milk every 2 hours, flavored if desired with tea, coffee, or caramel—to a total of 3 quarts of milk a day. After the initial 3 days, various farinaceous and milk preparations (malted milk, chocolate milk, custards, etc.) are added to the milk diet. Within 4 to 7 days a light breakfast is allowed; later a chop is given as a noon meal. By the end of the first 10 days of the treatment, the patient is given 3 full meals, together with 3 to 4 pints of milk with or after meals. The foods may be selected by the patient.

It has recently been pointed out that the neurasthenic syndrome may

be the earliest manifestation of a thiamine deficiency.[2] This is undoubtedly not the cause of all or even most of the neurasthenias, but it is well to bear in mind the fact that an occasional case may respond dramatically to vitamin B_1 treatment.

MULTIPLE SCLEROSIS

This is a chronic disease of young adults, and neither the cause nor the treatment are known at present. It usually begins in the twenties or thirties with transient disturbance in vision, urination, gait, or coordination. It is slowly progressive, but there are almost always periods of remission during which most of the difficulties disappear, only to recur or be replaced by new symptoms. It does not kill, but the victims of this disease are usually confined to a wheel-chair within 7 to 10 years after the onset of the disease.

It has been shown that many patients with multiple sclerosis are poor eaters, avoiding especially dairy fats—butter, cream, etc.—to the point of definite nutritional deficiency. Brickner and Brill[3] studied a group of 34 multiple sclerotics with special attention to dietary factors and found that sudden prolonged limitations in diet were apparently associated with some fresh attacks of the disease. They were able to precipitate attacks in 12 patients by limiting their food intake, and all but 6 patients did well on corrected diets over a 14-month period. These workers noted some correlation between the nutritional state of the patient and the intensity and speed of involvement by the disease. On the basis of their studies they recommend high-calorie diets for patients with multiple sclerosis.

COMBINED DEGENERATION

This is the neurological complication of pernicious anemia. It manifests itself by progressive difficulty in walking due to stiffness and weakness of the legs and loss of the ability to know the position of the feet in space without watching them. The arms and hands are also involved, sometimes earlier than the feet and legs. Along with the stiffness and loss of position sense and power, there are often disturbing

[2] Norman Jolliffe, "Treatment of Neuropsychiatric Disorders with Vitamins," in *Journal of the American Medical Association*, 117 (1941), 496.

[3] R. M. Brickner and Brill, "Dietetic and Related Studies on Multiple Sclerosis," in *Arch. Neurol. & Psychiat.*, 46 (1941) 16.

paresthesias—pins-and-needles sensations—which may be the patient's chief complaint.

The neurological aspects of the disease may become manifest before the development of the pernicious anemia itself, but the treatment of the combined degeneration is the treatment of the pernicious anemia (see page 297). If this special treatment is instituted promptly and vigorously, the combined degeneration will be stopped short and may even regress. In those cases of pernicious anemia which are diagnosed early, before the onset of the neurological signs, the combined degeneration may be completely prevented by properly balanced diet.

PERIPHERAL NEURITIS

Pain is the most frequent and severe manifestation of this syndrome, and is usually accompanied by unpleasant pins-and-needles sensations, tenderness on touch or movement, numbness, and weakness. If allowed to progress untreated, complete paralysis and loss of all sensation may occur. The disease affects the hands and feet first—bilaterally and symmetrically. As it progresses it involves wrists and ankles; later still, the entire arms and legs.

Many various conditions may play a causative role in this disease—alcoholism, lead or arsenic poisoning, diabetes, pregnancy, etc.—but if the cases are studied carefully a history of inadequate diet will often be elicited. In some cases patients lose their appetites and consequently food intake is limited; in some vomiting or other gastro-intestinal disturbance interferes with digestion or absorption of dietary factors; in others there is actual gastric or hepatic dysfunction preventing the utilization of food elements.

Not only can an inadequate diet cause peripheral neuritis, an adequate diet can protect the nerves against poisons which could otherwise damage them. There is definite evidence that thiamine (vitamin B_1) is "antineuritic," and other members of the "B" complex also may be of benefit. There is experimental evidence which tends to show that vitamins A, C, and D may also help in protecting nerves against degeneration.

In treating peripheral neuritis, the patient should be at absolute bed rest; sedated and relieved of his pain with suitable drugs. The diet should be appetizing, fresh, and varied. Most important of all, it must be rich in all vitamins, particularly vitamin B_1. In severe cases, crys-

talline vitamins should also be given intramuscularly or intravenously, and yeast and liver extract added to the diet.

DELIRIUM TREMENS

This is an acute psychosis which occurs only in chronic alcoholics and most often after a particularly heavy drinking bout, an injury, or an acute infection. It is characterized by great restlessness, insomnia, tremors of the entire body, and an acute delirium with horrifying visual hallucinations. In the later stages the patient shows increasing exhaustion from his constant psycho-motor activity, and dehydration and malnutrition since he does not eat or drink.

The treatment consists of rest and sleep, which can only be obtained with drugs; adequate intake of water to combat dehydration; and large amounts of carbohydrate to combat starvation and acidosis. Wortis[4] pointed out that orange juice is readily obtained, easily digested, and that alcoholics will take and retain it even when they have gastro-enteritis. It should be sweetened with as much sugar as the patient will tolerate, since sugar speeds the elimination of alcohol from the body and aids in building up liver glycogen, which is often depleted in these patients. This is another condition associated with vitamin B_1 deficiency, and large amounts of this vitamin must be administered in the diet as well as parenterally.

DISEASES OF THE NEUROMUSCULAR SYSTEM

There are several diseases which cause progressive wasting of the body musculature with or without involvement of the spinal cord. For our present purposes these may be considered together.

Amyotrophic lateral sclerosis begins most often in the hands and shoulders with progressive weakness and wasting of the muscles, due to degeneration of certain cells in the spinal cord. It has been shown that a deficiency of vitamin E in the diet can cause this disease, and that treament with vitamin E can stop the progress of the disease in some cases.[5] It is usually fatal in 3 to 6 years.

[4] H. Wortis, "Delirium Tremens," in *Quarterly Journal of Studies in Alcohol,* 1 (1940) 251.

[5] I. S. Wechsler, "Amyotrophic Lateral Sclerosis Treated with Synthetic Vitamin E," in *Arch. Neurol & Psychiat.,* 45 (1941), 873.

Progressive muscular dystrophy is a disease characterized by slow but constantly advancing weakness and wasting of all the muscles. It begins during childhood and continues for 20 or 30 years, gradually interfering with all activity and leaving the patient bedridden. It has been reported that these patients may be benefited by treatment with vitamin E.[6] They are also advised by some neurologists to take a high-protein diet, with 10 grams of gelatin and 15 grams of glycine daily. The results obtained with this diet are doubtful.

Vitamin E is available in pure form and is contained in oil of wheat germ, seeds and green leaves, mild fat, and, in low concentration, in meats.

PERIODIC PARALYSIS

This is a relatively rare disease which has a familial incidence, affects males three times more often than females, and is characterized by sudden attacks of complete flaccid paralysis of the legs or the entire body; coming on without warning at intervals of weeks, months, or years, and persisting for a variable period of 12 to 24 hours. Little is known of the underlying cause of the disease, but it is known that attacks can be precipitated in susceptible patients by the ingestion of a high-carbohydrate meal or a deficiency of potassium salts in the diet.

Therefore, patients who have had one episode of periodic paralysis can be kept free of further attacks by limiting their intake of carbohydrate to 100 grams per meal and including in their diet liberal quantities of foods rich in potassium salts. (For table listing foods highest in potassium see page 686.)

MENIERE'S SYNDROME

This condition is characterized by apoplectiform attacks of intense vertigo, associated with nausea, vomiting, falling, and a cold sweat. Patients may have daily attacks lasting a few hours or less frequent attacks lasting several days.

There is some evidence to show that ingestion of sodium salts will precipitate attacks or increase their frequency. On this basis the Furstenberg[7] dietary regime has been recommended. It consists in elimi-

[6] B. J. Alpers and H. S. Gaskell, "Effect of Vitamin E on Muscular Dystrophies," in *Ibid.*, 45 (1941) 364.
[7] A. C. Furstenberg, *et al.*, "Meniere's Symptom Complex: Medical Treatment," in *Annals of Otology, Rhinology, and Laryngology*, 43 (December 1939), 1935.

nating sodium chloride from the diet as completely as possible and replacing it with ammonium chloride which further reduces the retention of sodium in the body.

FURSTENBERG DIETARY REGIMEN

1. Protein, unrestricted or forced.
2. Calories, as indicated.
3. Low salt content.
4. Medication. Ammonium chloride, 3 grams with each meal, in capsules.
5. Water intake unrestricted, although excessive quantities of liquids should not be taken.
6. Diet, approximate neutral, low-sodium diet.

Group A—foods to be taken daily

1. Eggs, meat, fish, and fowl as desired.
2. Bread as desired.
3. Cereal, one of the following: farina, oatmeal, rice, puffed rice, or puffed wheat.
4. Potato and one or more servings of any of the following: macaroni, spaghetti, rice, corn, cranberries, prunes, plums.
5. Milk as desired.
6. Vegetables and fruits daily of any fruit and vegetable not included in groups "B" and "C," as desired.
7. Butter, cream, honey, jellies, jams, sugar, and candy permitted as desired.
8. Tea and coffee as desired.

Group B—foods to be avoided:

All salt meats and fish, or bread, crackers, and butter prepared with salt. Carrots, clams, condensed milk, raisins, caviar, cowpeas, olives, spinach, cheese, endive, oysters.

Group C—foods to be taken no more than twice weekly:

Lima beans, beets, buttermilk, cantaloupe, cauliflower, celery, chard, dried cocoanut, dried currants, dates, figs, horseradish, kohlrabi, limes, muskmelon, peanuts, peaches, mustard, pumpkins, radishes, rutabagas, strawberries, turnips, turnip tops, water cress.

NOTE: All food to be prepared and served without salt.

POLIOMYELITIS

The relation of diet to susceptibility to poliomyelitis (infantile paralysis) is not clearly understood. In 1939 a study was made in Canada [8] of the dietary histories of 50 patients with this disease in an effort to determine whether or not there was any single food factor which seemed to be universally low or absent among them. From this work it was concluded that these patients had a universally low intake of vitamin B_1, and there were even reports that good results had been obtained in these cases with large doses of thiamine chloride. However, in 1944 a report appeared which raised some doubts as to the relation between vitamin B_1 and poliomyelitis.[9] Experiments were described which tended to show that mice maintained on a vitamin B_1-deficient diet were more resistant to the virus of poliomyelitis than those with more adequate B_1 intake. No conclusion can be drawn as yet, but further studies will clarify the role played by dietary factors in this disease.

QUESTIONS FOR STUDY

1. In what neurological disease is an adequate intake of vitamin E considered essential? Vitamin B_1? Potassium salts?
2. If you were caring for a patient who had had one attack of multiple sclerosis, what diet would you advise to lessen the frequency of subsequent attacks?
3. Should a patient with Meniere's Syndrome take more or less salt than a normal person? A patient with a brain tumor?
4. What dietary recommendations would you make to a patient with neurasthenia?
5. Which of the three food substances (carbohydrate, protein, or fat) is important in delirium tremens? Why?
6. What diet would you advise for a patient with combined degeneration complicating pernicious anemia?
7. What general dietary rules should be made for all epileptics? Under what circumstances would you prescribe a ketogenic diet?

[8] W. J. McCormick, "Vitamin B Therapy in Inflammatory and Degenerative Diseases of Nervous System," in *Medical Record,* 150 (1939), 303.

[9] C. Foster, *et al.,* "Effect of Vitamin B_1 Deficiency and of Restricted Food Intake on the Response of Mice to Lansing Strain of Poliomyelitis Virus," in *J. Exper. Med.,* 79 (1944) 221.

19.
ARTHRITIS AND GOUT [1]

ARTHRITIS

Arthritis or, as it is sometimes called, chronic rheumatism, is a generalized disease which manifests itself particularly at the joints.

Types There are two main types of arthritis: atrophic and hypertrophic.

The former chiefly affects individuals in the first half of life, and leads to destruction of cartilage and often to stiffness of the joints. Patients suffering from this form of the disease may be profoundly ill.

Hypertrophic arthritis is a disease affecting chiefly the latter half of life. It is also accompanied by destruction of cartilage, but overgrowth of bone takes place as well. Individuals so affected are not usually profoundly ill, although great crippling and wheel-chair invalidism may result.

Cause It was formerly supposed that arthritis was the result of focal infection only, but present opinion holds that neither any single infectious agent nor any completely defined dietary deficiency or metabolic disturbance is the sole cause of this disorder. Rather, that any one of these factors or certain combinations of them, under appropriate circumstances, may basically underlie the onset of the disease. The modern viewpoint is increasingly to the effect that imbalance in the neuro-endocrine system underlies the problem.

Diet There is no specified diet which must apply to all cases of arthritis. A generally balanced diet is used. It is probable that arthritics will do better upon a diet adequate in calories, low rather than high in

[1] This chapter was prepared by Dr. Ralph Pemberton, professor of medicine at the Graduate School of Medicine, University of Pennsylvania; past president of the American Rheumatism Association; president of the International League against Rheumatism; former member of the Council on Physical Therapy, American Medical Association; president of the Pan-American League against Rheumatism; author of *Arthritis and Rheumatoid Conditions: Their Nature and Treatment* (Lea & Febiger) and *The Medical and Orthopaedic Management of Chronic Arthritis* (with R. B. Osgood, Macmillan). Revised by Dr. Pemberton, 1944.

carbohydrates, adequate or slightly more so in respect to protein, accompanied by larger rather than smaller amounts of fat, compatibly with the digestive capacity of the patient, and made up, so far as bulk is concerned, of fruits and green vegetables.

Heredity plays a definite role in the incidence of chronic arthritis. Sometimes, indeed, the disease seems to be familial. It is difficult to say precisely what is inherited, but among other things the general bodily configuration and make-up can be definitely cited. The structure of the body depends in part upon the general skeletal build of the individual and upon the positions of various organs in the thorax and abdomen, as well as their anatomical relations to each other.

Thus, the tall, slender, flat-chested, lordotic, and enteroptotic type of individual is generally recognized as representative of that type of person apt to be affected by atrophic arthritis. One of the factors giving rise to the prominent abdominal silhouette of such an individual is displacement as well as dysfunction of the gastro-intestinal tract. This condition may be congenital or it may be acquired, and it is nearly always acquired in the course of chronic arthritis, especially when accompanied by marked invalidism.

Whether the gastro-intestinal dysfunction be primary or secondary, it usually requires attention during the course of treatment. The condition of the gastro-intestinal tract referred to is characterized by atony of the musculature which results in the falling, dilatation, elongation, and tortuosity of the large bowl, as well as in hyposecretion, best exemplified by hypochlorhydria. Spasticity may also be present. Intestinal stasis is a frequent concomitant, often in the form of masked stasis.

It is possible that a hitherto unappreciated deficiency of vitamins contributes to this general situation. In any event, it is quite clear that unbalanced diets, low in vitamin, high in carbohydrate, and low in protein, will produce in experimental animals the gastro-intestinal picture seen in arthritics, which can be corrected by properly balanced diets.

Other things being equal, patients presenting the above picture should be given diets relatively low in carbohydrate, relatively high in protein, and amply supplied with vitamins. Hydrochloric acid is often essential to better function of the gastro-intestinal tract.

Among arthritics who recover upon dietetic lines, it is not infrequent to observe under X-ray examination striking betterment in the position, configuration, and function of the gastro-intestinal tract.

It should be mentioned in passing that chronic arthritics frequently

present a "lowered sugar tolerance." This should not necessarily be interpreted as an indication of a low carbohydrate diet since it is probably referable to disturbances in the capillary bed rather than to a true error in the metabolism of carbohydrate. Curtailment of the blood supply to many tissues probably leads also to the lowered metabolic rate encountered in about 30 per cent of all arthritics. This deviation may be wholly referable to mechanical factors of the nature mentioned, but dysfunction of the thyroid is also to be considered, especially secondary to influences stemming from the anterior pituitary and perhaps other members of the neuro-endocrine chain.

Adequate protein is necessary in the diet of all arthritics, especially as many of them present a low-grade anemia; and much harm has been done by needlessly denying them meat on the mistaken idea that it adds to the metabolic errors.

Further justification of the use of dietetics in arthritis is found in the fact that arthritis is accompanied by a low-grade edema of some tissues. In this connection the storage of carbohydrate necessitates the storage of water; and, conversely, diets low in carbohydrates or of low caloric value promote loss of water from the body.

In some cases of arthritis the gastro-intestinal tract and dietetics play a significant role. Under these circumstances it is sometimes advisable to reduce the diet sharply for brief periods, in well-nourished individuals; but great care should be exercised that no contraindicating factors be present, such as fever, anemia, leucocytosis, etc. Cases of *osteo,* or hypertrophic arthritis, are often well nourished or even obese and can consequently be dieted with greater impunity. Under all circumstances the adequate nutrition of the individual must be kept sharply in mind.

A fairly safe rule for the determination of the caloric intake of an arthritic can be based upon the approximation of 30 calories per kilo. The appended diet of 2100 calories is suitable for a person of 70 kilos weight, presenting no contraindications, under conditions of rest in bed.

The proper use of dietetics in arthritis achieves strikingly beneficial results, but dietetics constitutes a two-edged tool capable of much harm as well as good. All treatment of the arthritic should proceed from a thorough visualization of his whole condition, and reliance should rarely be placed upon one measure alone.

Notwithstanding the somewhat iconoclastic attitude lately expressed by some writers, the influence of focal infection, as at least a contribu-

tory factor in the arthritic syndrome, must still receive full consideration; and equal attention must be given to betterment, by means of physical therapy and other measures, of those changes in the peripheral tissues which largely characterize the disease.

Rest in bed, or at least standardized periods of rest, is essential to all severe arthritics; and, by the same token, it is necessary that any diet administered to an arthritic be compatible with the demands which may be made upon him by the removal of focal infection or other vigorous measures.

The cautious use of diet as outlined above is of value in both atrophic and hypertrophic arthritis; but greater circumspection may be required in applying it to the former type. Hypertrophic arthritics are sometimes overweight, and a reduction of weight in them may be further advantageous for the purpose of reducing trauma to such joints as the knees and hips.

In general, consideration of dietetics in arthritis should involve consideration of the disease as a whole and the many factors concerned in etiology and treatment.

PEMBERTON'S SAMPLE DIET FOR ARTHRITIS

	GRAMS
Breakfast:	
Any 10% fruit	150
Egg, 1	
Crisp bacon	20
Whole-wheat bread, toasted	50
Butter	15
Sugar	10
Cream	30
Coffee, 1 cup	
Luncheon:	
Consommé or bouillon	
Any lean meat	30
10% vegetable	80
5% vegetable	80
5% vegetable, as tomato	80
Mayonnaise, or French dressing	15
Luncheon (continued):	
Whole-wheat bread	25
Butter, part on vegetables	20
10% fruit	150
Milk	240
Dinner:	
Lean meat	65
10% vegetable	80
Lettuce	40
Mayonnaise, or French dressing	15
Whole-wheat bread	50
Butter, part on vegetables	20
Milk, with 90 grams cream	120
15% fruit	150

GOUT

Cause In gout the metabolism of purine is disturbed in such a way that uric acid accumulates in the blood and tissues to an abnormal degree and is deposited in the joints and other tissues in chalky crystals of sodium urate. What causes this retention of uric acid and its deposition in the joints is not understood. It is probable that, in at least some cases of gout, imbalance of the neuro-endocrine system plays a basic role, much as it does in the syndrome of chronic arthritis. Gout is often related to overeating of rich foods, particularly those rich in nucleo-protein; to overindulgence in alcoholic beverages; and to lack of exercise.

Origin of uric acid Uric acid is one of a group of substances known as purins which are derived from the nucleo-proteins of plant and animal cells. The uric acid found in blood and tissue fluids comes largely from two sources: nucleo-proteins of body tissue, *endogenous purins,* and nucleo-proteins of food, *exogenous purins.*

In the normal processes of digestion and metabolism, nucleo-protein is broken down to nucleic acid and protein. The nucleic acid passes through various steps in its conversion into purins, and these on oxidation yield uric acid. Uric acid, therefore, is an oxidation product of other purins. Some of it is stored in the tissues, while some is carried in the blood stream. It is finally excreted in the urine. There is always a small amount of uric acid in normal blood and urine, even on a purin-free diet; but in gout the uric acid of the blood is usually increased, especially during an acute attack.

Excretion of uric acid Even when the diet supplies no purins, the urine of a gouty patient usually contains a fairly large amount of uric acid. If a diet rich in purins or nucleo-protein be fed, the amount of uric acid in the blood of both a normal person and a patient with gout will increase; but, in the case of the former, the excess will be eliminated in the urine in from 24 to 48 hours, while the latter will be unable to excrete it completely and the blood content will remain high. Just before an acute attack, the output of uric acid in the urine usually decreases, during the attack it increases markedly, and afterward it falls gradually.

General diet in gout The more nucleo-protein or purins the food contains, the larger will be the production of exogenous uric acid. Even endogenous uric acid is dependent to a certain extent on the character

of the diet. A protein-rich diet, though it may be purin-free, increases the formation of uric acid. A diet of high caloric value, regardless of its protein content, produces a like effect. Hence, in order to reduce purin metabolism to its lowest level as is desired in the treatment of gout, it is necessary to decrease the protein content and the fuel value of the diet as well as to eliminate all foods containing purins. In order to do this most efficiently and most safely, the patient should be at complete rest.

Diet in acute gout During an acute attack, a purin-free diet of very low caloric value is prescribed. Milk, cream, cereals, bread, butter, and fruits, simply prepared and given in small amounts, will be easily digested. Excessive amounts of fat are undesirable. Large quantities of water should be given.

Diet in chronic gout The aim in feeding cases of chronic gout is to give a diet which will avoid increasing the amount of uric acid in the body and at the same time assist in the elimination of that formed by the breakdown of body tissue.

Protein Protein should be sufficient to replace worn-out tissue. One gram of protein per kilogram of body weight is usually allowed. This must be supplied by foods containing little or no nucleo-protein or purins, such as milk, cheese, eggs, or cereals. Occasionally in mild cases very small amounts of well-cooked meat or fish are allowed.

Since the body is able to synthesize nucleo-proteins from nonpurin foods, it is advisable to guard against greatly exceeding the protein requirement.

Carbohydrate This may be taken in the form of fruits, purin-free vegetables, cereals, breads, and sugars.

Fat Cream and butter are valuable as long as the desired caloric quota is not exceeded. Large amounts of fat-rich foods or concentrated sweets should be avoided; for, apart from their fattening qualities, they are likely to bring on an acute attack and also to disturb digestion.

Minerals and vitamins The diet should be similar to the normal diet in mineral and vitamin content; for, as in every case in which the patient must adhere to the diet for months or years, all the dietary essentials must be supplied.

Caloric value of the diet The caloric value of the diet is regulated by the condition of the patient. It is recommended that the total calories for the day be possibly 10 per cent to 15 per cent below normal. This lowers the total metabolism—a decided advantage in gout. If the

patient is overweight, as he frequently is, the resulting loss of weight is to be encouraged. If, however, he is already below weight, more food should be given. McLester considers it advisable to maintain body weight at 10 per cent to 15 per cent below the standard.

Stimulants and condiments Coffee contains caffein, one of the group of purins; and, though it is doubtful whether this particular purin is converted into uric acid, coffee is limited to one small cup daily and preferably omitted entirely. Coffee substitutes may be used if desired. They help to insure a large fluid intake, which is another *desideratum* in this condition. Tea should also be used cautiously. Alcohol should not be permitted except upon the physician's orders.

Type of diet in gout Purin-free or purin-poor foods are indicated.

Foods allowed:

Cereals Farina and other fine cereals.
Bread White bread.
Dairy products Butter, cheese, cream, milk.
Eggs Except fried or hard-cooked.
Vegetables All kinds, except those listed under Foods to Avoid.
Fruit All kinds, in liberal amounts.
Soups Those made from permitted vegetables.
Beverages Milk, fruit beverages, and coffee substitutes.
Nuts All kinds except peanuts.
Desserts Those made of milk or fine cereals.

Foods to avoid:

Meat All kinds, especially liver, kidney, sweetbreads, and tongue. Also meat gravy.
Poultry and game All kinds.
Fish All kinds, especially sardines and anchovies.
Cereals Oatmeal and whole-grain cereals.
Bread Whole wheat bread.
Soup All meat soups.
Vegetables Asparagus, beans, string beans, peas, kale, spinach, and mushrooms.
Beverages Coffee, tea, and cocoa.
Alcoholic beverages All kinds.

A DAY'S MENU SUGGESTED FOR CHRONIC GOUT [2]

Breakfast:
- Orange juice
- Cream of wheat with cream and sugar
- Buttered toast
- Coffee substitute with sugar and cream

Luncheon:
- Cream of celery soup
- Baked potato
- Tomato and cucumber salad
- Bread and butter
- Baked apple with cream

Dinner:
- Eggs à la goldenrod
- Steamed rice
- Hearts of lettuce salad with French dressing
- Bread and butter
- Caramel ice cream

QUESTIONS FOR STUDY

ARTHRITIS

1. What are the types of arthritis and when do they chiefly occur?
2. Is arthritis confined to the joints?
3. What is the cause of arthritis?
4. Discuss the diet in arthritis.

GOUT

1. What derangement of metabolism characterizes gout?
2. What is the general principle of feeding in this disease?
3. In what way does the diet for gout differ from the normal diet?
4. Give a list of foods rich in purins.
5. Give a list of purin-free foods.
6. Arrange a day's menu of purin-free foods where soft diet should be given.

[2] The amount of food should be regulated by the patient's energy requirement and normal weight.

20.
DEFICIENCY DISEASES [1]

The term "deficiency disease" originally described the condition which develops from the use of a diet containing insignificant amounts or none at all of some one or other of the nutritive essentials. The form of the disease usually considered was the acute form in which symptoms were readily recognizable.

With the advance in our knowledge of nutrition, the term "deficiency disease" has come to have a somewhat broader concept. Besides the individual variations in dietary requirements discussed in Chapter 4, there are other conditioning factors which may influence the body's requirements. In diseases such as infections there may be a marked increase in tissue requirement. The failure of the dietary supply to meet this need represents a true deficiency. In other cases a deficiency may come from inability of the body, through some defect, to utilize the dietary supply. It has been suggested that, even though the most common causes of deficiency diseases are inadequacies of diet, "the term should connote a deficiency in the bodily tissue rather than in the diet." [2]

The degree of the deficiency and the relation of the time it has been in effect must also be considered. When it is realized that many of the dietary inadequacies commonly encountered are only partial as related to actual bodily requirements, it can readily be seen that periods of years may elapse before identifiable symptoms become apparent. The condition is then more or less chronic and may have few characteristics of the acute disease. Such cases are difficult to diagnose and still more difficult to treat. Often dietary deficiencies are periodic according to seasonal variation in the food supply or some other factor, thus presenting still another aspect. Findings as to the occurrence of such chronic

[1] For additional information consult James S. McLester, *Nutrition and Diet in Health and Disease,* 4th ed., Philadelphia: W. B. Saunders Company, 1944.

[2] *Inadequate Diets and Nutritional Deficiencies in the United States,* Bulletin 109, National Research Council, 1943.

cases in both the mild and the severe form are described by Kruse.[3] This author points out that either the acute or chronic condition may be present in any degree from mild to marked, and in some cases the acute and chronic processes may be present together.

The incidence of acute deficiency diseases in the United States is relatively low. When the term is used in this broader sense, however, a high prevalence of deficiency states is indicated. For this reason it becomes important not only to recognize subclinical as well as clinical conditions, but to be aware of the need for giving attention to early signs of nutritional failure. Tentative criteria for such observations are presented in the following tables:

SYMPTOMS AND SIGNS SUGGESTIVE OF EARLY DEFICIENCY STATES IN ADOLESCENTS AND ADULTS [4]

SYMPTOMS		PHYSICAL SIGNS	
1. Lack of appetite	(L)	1. Nasolabial sebaceous plugs	(N)
2. Lassitude and chronic fatigue	(L)	2. Sores at corners of mouth, cheilosis	(L)
3. Loss of weight	(L)	3. Vincent's angina	(D)
4. Lack of mental application	(L)	4. Minimal changes in tongue color or texture	(D)
5. Loss of strength	(L)	5. Red swollen lingual papillae	(D)
6. History of sore mouth or tongue	(L)	6. Glossitis	(D)
7. Chronic diarrhea	(L)	7. Papillary atrophy of tongue	(D)
8. Nervousness and irritability	(L)	8. Stomatitis	(D)
9. Burning, prickling of skin, paresthesias	(L)	9. Spongy, bleeding gums	(L)
10. Night blindness	(N)	10. Muscle tenderness, extremities	(D)
11. Abnormal intolerance of light, photophobia	(L)	11. Poor muscle tone	(D)
12. Burning or itching of eyes	(L)	12. Loss of vibratory sensation	(D)
13. Abnormal discharge of tears, lacrimation	(L)	13. Increase or decrease of tendon reflexes	(D)
14. Muscle and joint pains, muscle cramps	(L)	14. Hyperesthesia of skin	(D)
15. Sore bleeding gums	(L)	15. Bilateral symmetrical dermatitis	(D)
16. Tendency to bleed	(N)	16. Purpura	(D)
		17. Dermatitis; facial butterfly casal necklace, perineal, scrotal, vulval	(D)
		18. Thickening and pigmentation of skin over bony prominences	(D)
		19. Nonspecific vaginitis	(D)
		20. Follicular hyperkeratosis of extensor surfaces of extremities	(D)
		21. Rachitic chest deformity	(D)
		22. Anemia not responding to iron	(D)
		23. Fatigue of accommodation	(D)
		24. Vascularization of cornea	(D)
		25. Conjunctival changes	(D)

L, those which parents or teachers might observe.

N, those which nutritionists or nurses might observe.

D, those which physicians only would be expected to observe. The physician would take into account all other symptoms whether or not they have been previously observed.

[3] H. D. Kruse, "A Concept of Deficiency States," in *Milbank Memorial Fund Quarterly,* 20 (July 1942), 245.

[4] From "Recognition of Early Nutritional Failure in Infants, Children, Adolescents, and Adults," in *Journal of the American Medical Association,* 118 (February 1942), 615-6.

SYMPTOMS AND SIGNS SUGGESTIVE OF EARLY DEFICIENCY STATES IN INFANTS AND CHILDREN[4]

SYMPTOMS		PHYSICAL SIGNS	
1. Lack of appetite	(L)	1. Lack of subcutaneous fat	(N)
2. Failure to eat adequate breakfast	(L)	2. Wrinkling of skin on light stroking	(N)
3. Failure to gain steadily in weight	(L)	3. Poor muscle tone	(D)
4. Late period of sitting, standing, walking	(N)	4. Pallor	(N)
5. Aversion to normal play	(L)	5. Rough skin (toad skin)	(N)
6. Chronic diarrhea	(L)	6. Hemorrhage of newborn (K)	(D)
7. Inability to sit	(L)	7. Bad posture	(L)
8. Pain on sitting and standing	(L)	8. Nasal blackheads and white-heads	(N)
9. Poor sleeping habits	(L)	9. Sores at angles of mouth, cheilosis	(L)
10. Backwardness in school	(L)	10. Rapid heart	(N)
11. Repeated respiratory infections	(L)	11. Red tongue	(D)
12. Abnormal intolerance of light, photophobia	(L)	12. Square head, wrists enlarged, rib beading	(N)
13. Abnormal discharge of tears	(L)	13. Vincent's angina, thrush	(D)
		14. Serious dental abnormalities	(N)
		15. Corneal and conjunctival changes—slit lamp	(D)

L, those which parents or teachers might observe.
N, those which nutritionists or nurses might observe.
D, those which physicians only would be expected to observe. The physician would take into account all other symptoms whether or not they have been previously observed.

DISORDERS DUE TO VITAMIN DEFICIENCIES

VITAMIN A DEFICIENCY

Vitamin A is concerned with the nutrition of the epithelial structures. A deficiency in the dietary supply of vitamin A brings about changes in these structures throughout the body. The primary effect is atrophy of the epithelium with replacement by keratinizing epithelium. This effect is highly characteristic and specific.

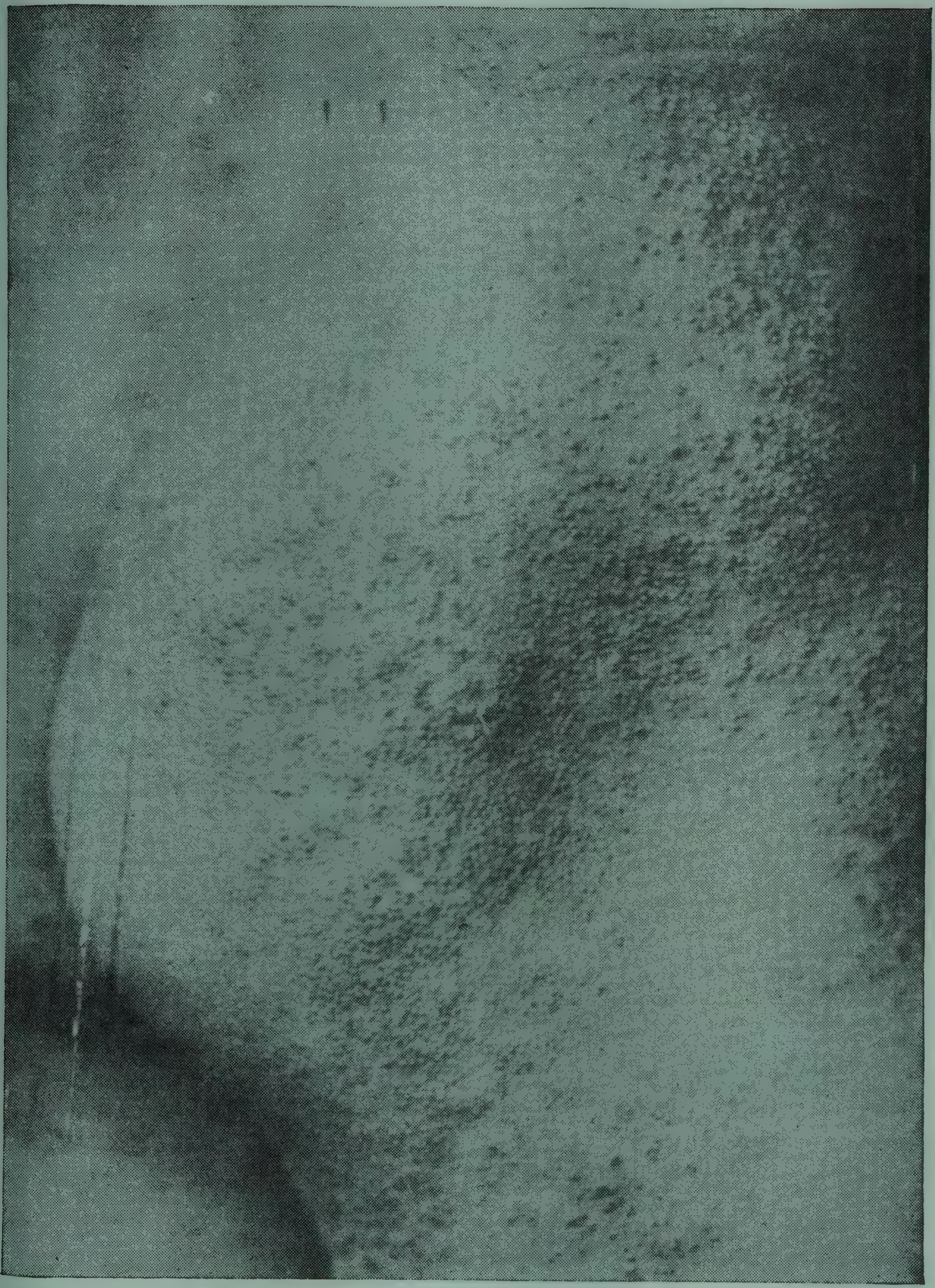
The eye *Xerosis* appears rather early and is evidenced first by burning and itching of the lids. As the condition progresses, folds appear in the conjunctivae with patches of cornified cells (Bitot spots) easily recognized by the experienced observer. *Xerophthalmia* presents a more severe condition of deficiency in which the cornea becomes dry and finally opaque. This condition is seen infrequently in the United States.

Hemeralopia, or nightblindness, is a functional disorder and occurs relatively early in vitamin A deficiency. Vitamin A is a constituent of the pigment, visual purple, present in the retina and essential to vision

in dim light. Without an adequate supply of vitamin, regeneration of visual purple is delayed on exposure of the eye to dim light, with the consequent inability of the person to see objects until considerable time has elapsed. The measure of time required for dark adaptation (Biophotometer) has been used for detecting vitamin A deficiency.

Xerophthalmia in a six-months-old boy, showing diffuse dryness and beginning kerotomalacia in the left eye. (*Courtesy,* Hoffmann La Roche, Inc., Nutley, N. J.).

The skin Changes in the skin appear fairly early. These are characterized by papules around the hair follicles on the extensor surfaces of the arms and legs, on the back and buttocks. Transverse ridges on the nails occur frequently in this deficiency.



Keratotic follicles and scalines in a vitamin A deficiency. (*Courtesy,* Hoffmann La Roche, Inc., Nutley, N. J.).

Other tissues and organs One of the earliest recognized effects of vitamin A deficiency was keratinization of the mucosa of the respiratory tract. Considerable study has been made of the possible effect of vitamin A on the incidence of the common cold. Probably the most that can be said from the results is that administration of vitamin A *may* reduce the severity and the duration of colds.

Transverse ridges in the nails in A-avitaminosis. (*Courtesy,* Hoffmann La Roche, Inc., Nutley, N. J.)

The characteristic cellular changes may also be found in the genito-urinary tract, the gastro-intestinal tract, the thyroid and other glands, as well as the central nervous system. A deficiency of vitamin A markedly affects the growth of tooth enamel and the formation of dentin.

Dietetic treatment Foods high in vitamin A or with high vitamin A value should be used abundantly in the diet.

Foods high in vitamin A and vitamin A value

1. Milk, cream, butter, full milk cheese 2. Eggs (yolk) 3. Liver 4. Thin green leaves 5. Green and yellow vegetables

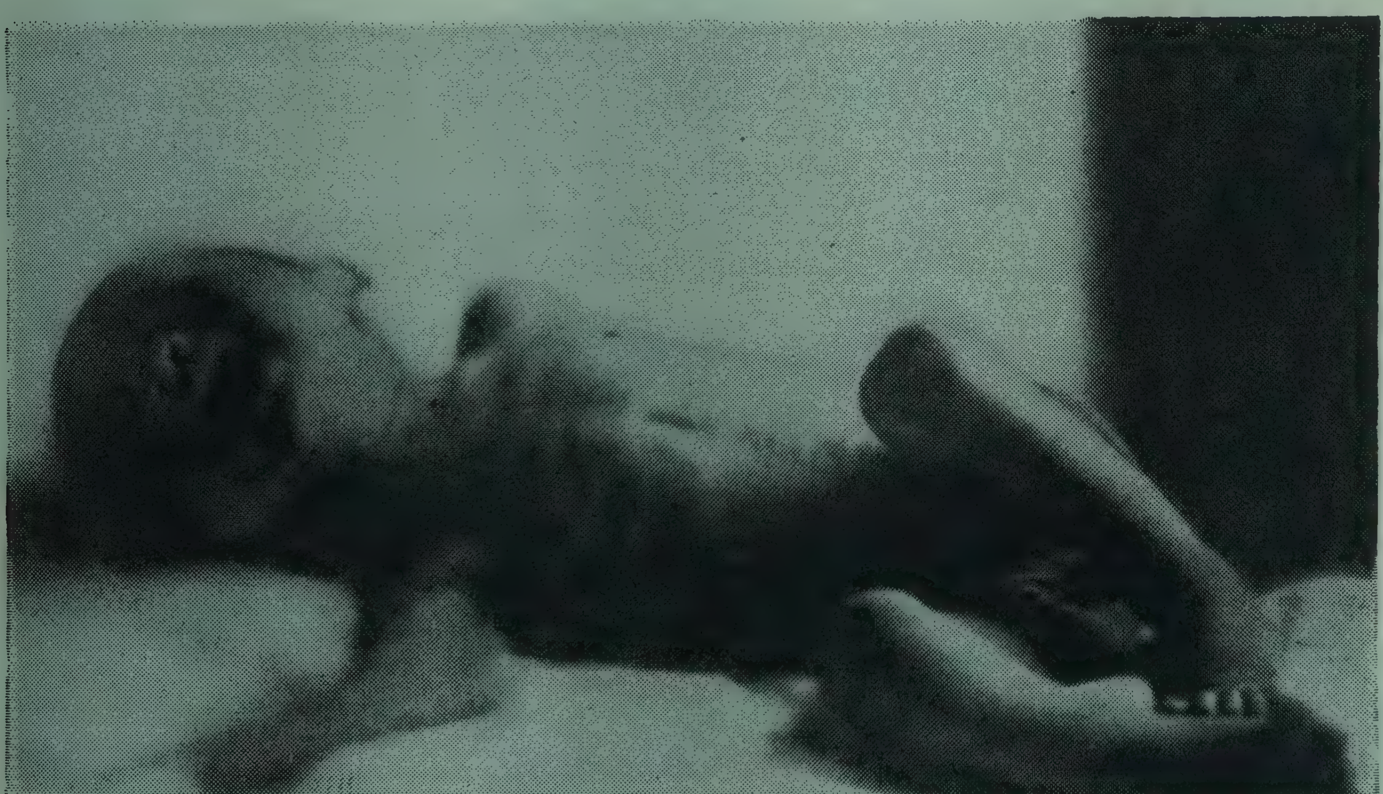
Concentrates are given as directed by a physician.

VITAMIN C DEFICIENCY

Scurvy Scurvy, the disease resulting from a lack of vitamin C in the diet, was one of the first deficiency diseases recognized. Although cases of the acute disease are relatively rare in the United States, the milder forms are seen not infrequently, and more especially in infants and young children.

Vitamin C controls the formation and maintenance of intercellular material. Without vitamin C, this tissue fails.

In vitamin C deficiency the walls of the capillaries become fragile. Hemorrhages into the surrounding tissue occur in the skin, around the joints, and in the gums. Changes take place in the bones with enlargements in the joints and resorption of the supporting structures for the teeth. The teeth become fragile and loose.



Infantile scurvy, showing typical contractions of extremities from pain. (*Courtesy,* Hoffmann La Roche, Inc., Nutley, N. J.)

The first symptoms of the disease are listlessness, lack of energy, failure of appetite, and irritability. As the disease advances there is soreness in the joints and muscles; petechial hemorrhages occur in the skin, especially when it is subjected to pressure; lesions of the mouth include hemorrhages and ulceration. In the advanced stage the bones become fragile and the teeth loose.

The incidence of subclinical, or mild, forms of scurvy is probably higher than is recognized at the present time because the symptoms are still obscure. Some aspects of dental disease have been described as possibly due to vitamin C deficiency. Anemia may also be an accompanying manifestation. The possible role of vitamin C in other disorders is also suggested. The requirement for vitamin C seems to be increased in the case of infection.

Dietetic treatment The first step in dietetic treatment is to include in the diet foods rich in vitamin C. Ascorbic acid is given under the direction of a physician.

Foods rich in vitamin C

1. Citrus fruits (oranges, grapefruit, lemons, tangerines) 2. Tomatoes 3. Cabbage and other salad greens

VITAMIN D DEFICIENCY

Rickets Rickets is a disease of infancy and early childhood caused by imperfect calcification of the skeletal structures—bones and teeth. Vitamin D functions in the metabolism of calcium and phosphorus into the supporting structures of the bones and teeth. Rickets follows from a deficiency of either of these elements, a distinct form arising in each case. Vitamin D cannot take the place of these elements, but seems to function in the mobilization of the reserves of either one in the case of a *partial* shortage.

Vitamin D is not present in any food in high concentration. Sunlight containing ultraviolet rays, has the power to change a sterol present in the skin into vitamin D. Children exposed to clear sunlight seldom show symptoms of rickets. The incidence of the disease may be high among children in cities, where the sunlight loses much of its ultraviolet content by passage through smoke and dust-laden air.

The initial symptoms of the disease are restlessness and irritability. Muscles and ligaments lack firmness, and bones are weak with enlargements in the growing ends. As the disease progresses, deformities appear in the bony structure with resulting bowlegs and knock knees, enlargement of wrists and ankles, and deformities of the chest and head.

Dietetic treatment The diet should be made fully adequate. Milk should be used to supply calcium and phosphorus. Vitamin D concentrates or preparations are used according to directions of a physician.

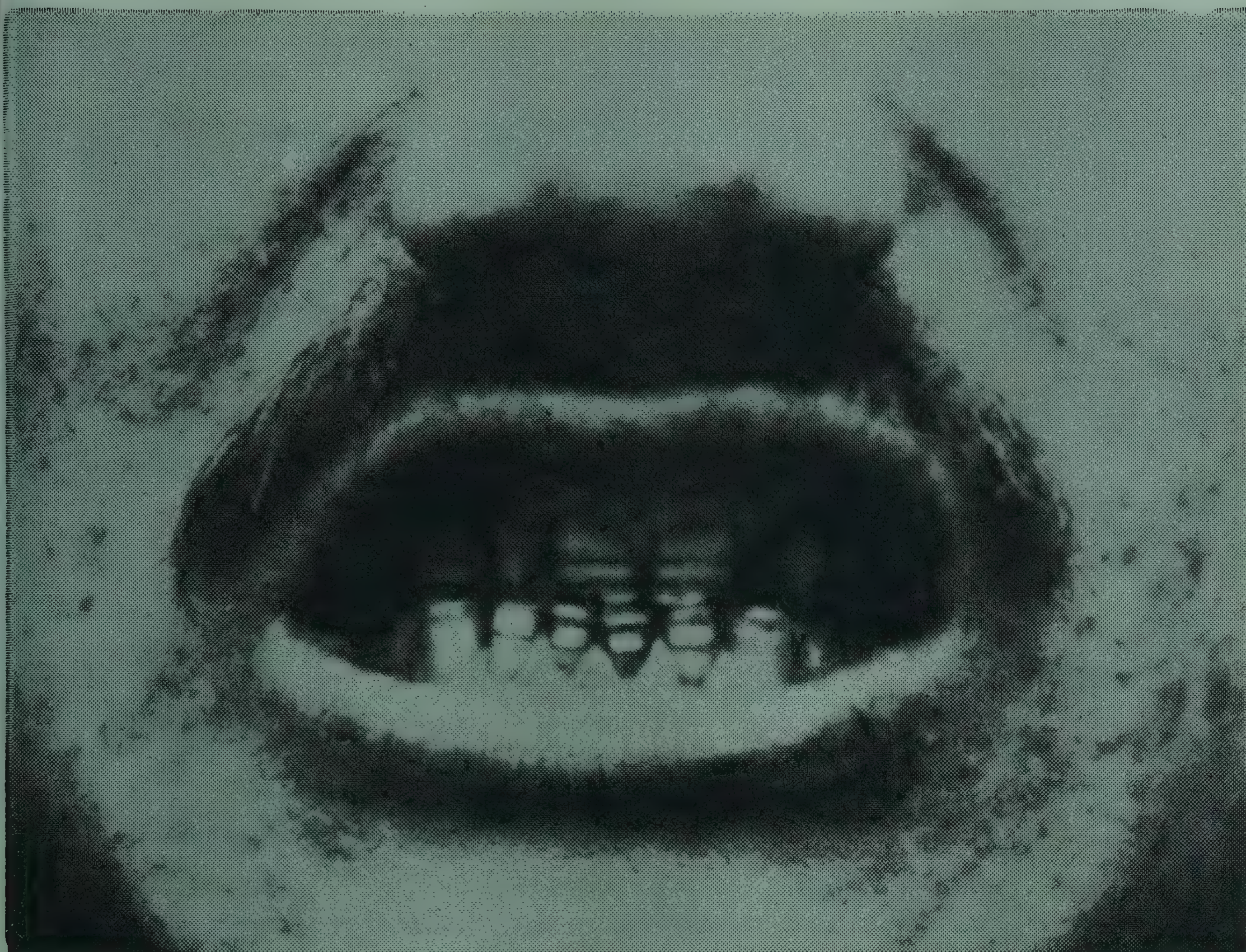
Typical deformities in rickets. (*Courtesy,* Hoffmann La Roche, Inc., Nutley, N. J.)

Square head as seen in rickets. (*Courtesy,* Hoffmann La Roche, Inc., Nutley, N. J.)

THIAMINE DEFICIENCY

Beri-beri This disease, which results from the use of an "unbalanced" diet primarily devoid of or containing only minimal quantities of vitamin B_1, has been known for centuries. Its manifestations are muscular atrophy, generalized edema, multiple peripheral neuritis, and enlargement of the heart.

Although the importance of and the need for an adequate supply of vitamin B_1 in the diet is fully recognized, the pathology and symptomatology of the deficiency disease are still more or less obscure. This is especially true of the early stages of the disease and in conditions arising from partial deficiency. Vague initial symptoms are given as "depression, lack of initiative, irritability, easy exhaustion, digestive discomfort, and pain in the muscles." As the deficiency continues, symptoms from structural changes in the body become marked—edema, muscle atrophy, neuritis, and myocardial disease. The edema may be of the wet or dry type.



Rachitic teeth in a twenty-five-year-old male. (*Courtesy,* Hoffmann La Roche, Inc., Nutley, N. J.)

Dietetic treatment A fully adequate diet is required, with special emphasis on the use of properly cooked vegetables,[5] meat, milk, and eggs. Cereals should be of the whole-grain or enriched type. Fruits should also be used for other values. Pure preparations of thiamine or vitamin B_1 concentrates are given under a physician's directions.

There are few foods which contain concentrated amounts of thiamine. This vitamin is present in many foods in small amounts.

Foods rich in thiamine

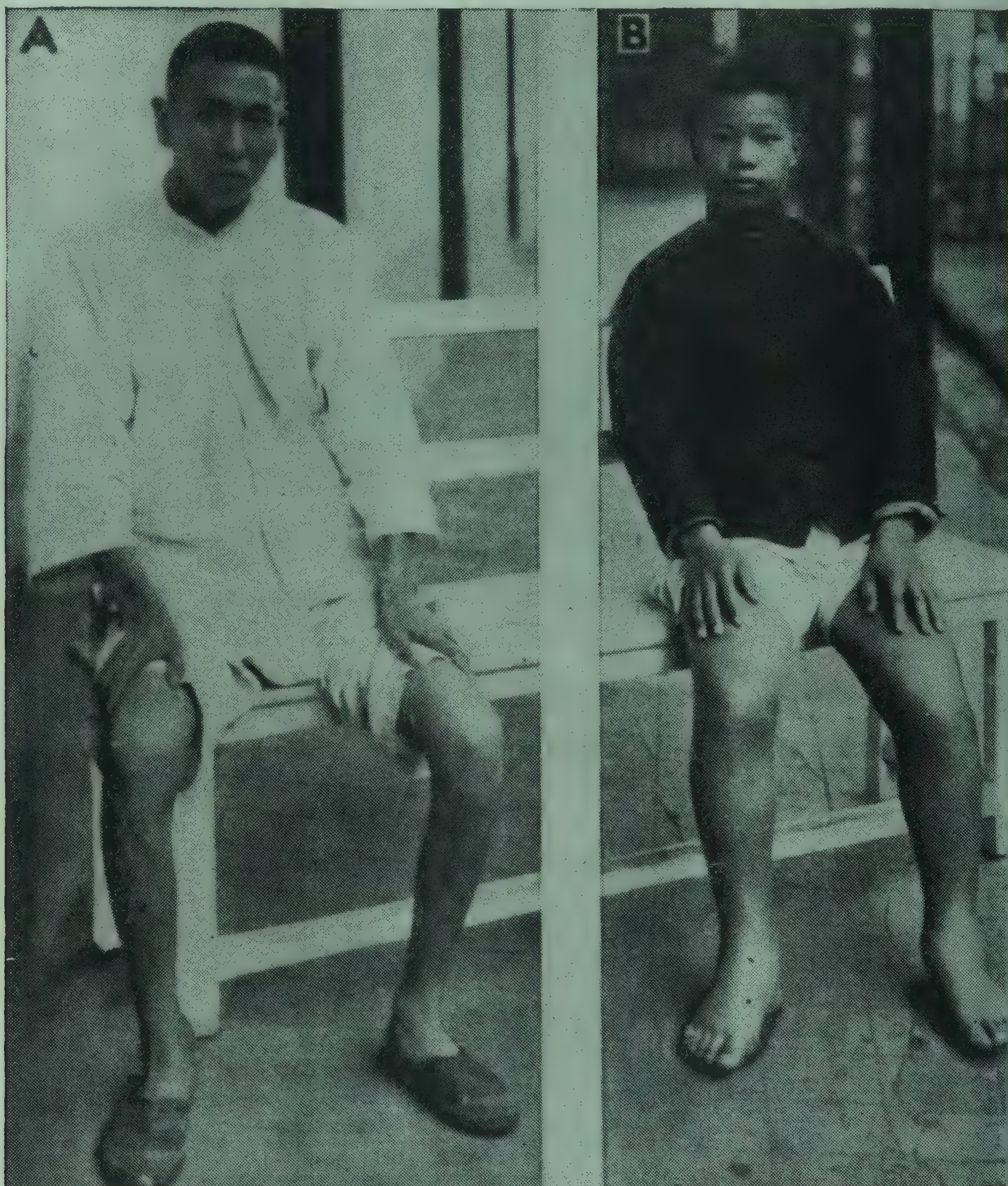
1. Vegetables, cooked by steaming for retention of Vitamin B 2. Cereals, whole-grain or enriched 3. Legumes, peas and beans 4. Meats 5. Milk 6. Eggs

RIBOFLAVIN DEFICIENCY

Studies carried out under controlled conditions show that a dietary deficiency of riboflavin leads to characteristic lesions. The most pro-

[5] Vitamin B is soluble in water, and foods cooked in large amounts of water for long periods lose vitamin B_1, which remains in the cooking water.

nounced of these is vascularization of the cornea, with the capillaries gradually pushing in from the periphery as the deficiency continues. Other superficial symptoms, such as burning and itching of the eyes, lacrimation, visual fatigue, photophobia and blurred vision, may also be experienced.



A—Atrophic form of beri-beri. B—Edematosis form of beri-beri with pigmentation and xerosis of the skin. (*Courtesy,* Hoffmann La Roche, Inc., Nutley, N. J.).

Pellagra dermatitis. (*Courtesy,* Hoffmann La Roche, Inc., Nutley, N. J.)

Fissuring of the mucosa at the angles of mouth (cheilosis) has also been recognized as a characteristic feature. Similar fissures may also be seen in the folds of the eyelids and at the base of the nose. The red color of the tongue is considered by some as highly characteristic.

Symptoms of riboflavin deficiency are found as a frequent accompaniment of other deficiency conditions.

Dietetic treatment Since ariboflavinosis is due to the use of an inadequate diet, the dietetic treatment consists in the use of a well-balanced diet containing plenty of the riboflavin-rich foods. Administration of riboflavin is carried out according to the directions of a physician.

Foods rich in riboflavin

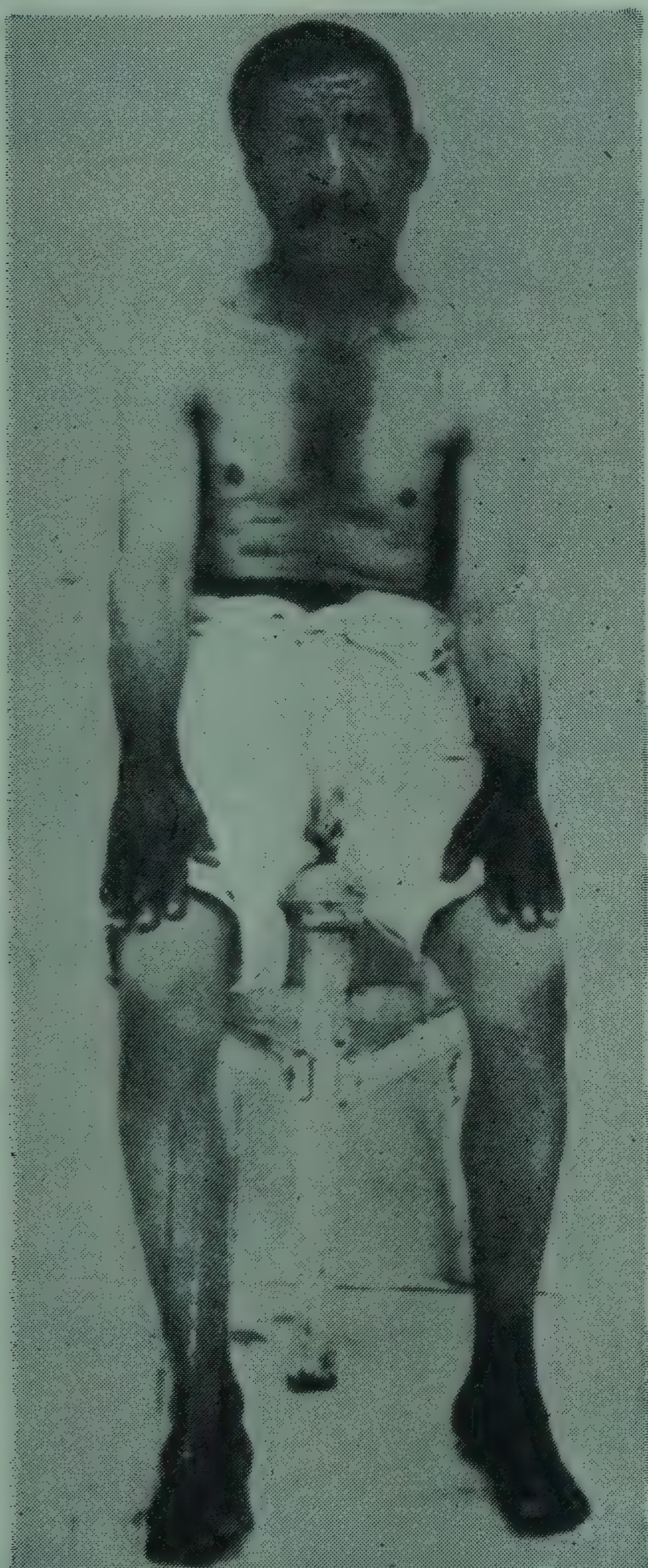
1. Milk 2. Eggs 3. Meats 4. Green leafy vegetables

NICOTINIC ACID DEFICIENCY

Pellagra This nutritional deficiency disease is endemic in certain regions, and in the United States is more prevalent in the southern part; although cases, especially of alcoholic pellagra, are frequently found in other sections.

Pellagra dermatitis. (*Courtesy,* Hoffmann La Roche, Inc., Nutley, N. J.)

The symptoms include skin manifestations, mucosal changes, dis-urbances of the gastro-intestinal tract and nervous system. The skin



Another example of pellagra. (*Courtesy,* Hoffman La Roche, Inc., Nutley, N. J.)

changes are most characteristic, although they may be preceded by gastro-intestinal and nervous symptoms. The backs of the hands, fore-

arms, and tops of the feet first show a redness which gradually develops into a severe dermatitis typified by its symmetrical appearance. The lesions on the neck resemble a necklace or collar.

The tongue and mucous membranes of the mouth are usually characteristically red and inflamed, and the entire gastro-intestinal tract may be involved. Nervous symptoms vary from mild irritation to mania, according to the severity of the disease.

A deficiency of nicotinic acid in the dietary is the primary factor involved in the onset of pellagra. It is still uncertain whether pellagra should be considered a syndrome resulting from a deficiency of a single factor or of two or more. The more pronounced symptoms clear up on the administration of adequate amounts of nicotinic acid. Often thiamine and/or riboflavin are required for full recovery. In most cases the improvement in the diet that usually accompanies therapy with nicotinic acid is all that is necessary.

Dietetic treatment The dietary treatment should be determined according to the condition of the patient. The severely ill patient is started on a liquid diet containing a generous amount of milk and eggs. This diet may then be gradually built up to include vegetables, friuts and meat.

"LIQUID" DIET FOR PELLAGRA (Spies, Chinn and McLester) [6]

Food included in one day	WEIGHT IN GRAMS	*Approximate Amount*	PROTEIN (*gm.*)	FAT (*gm.*)	CARBOHYDRATES (*gm.*)
Sweet milk in eggnog	2400	12 average glasses	79	90	120
Cream, 18%	120	4 oz.	3	24	6
Eggs	450	9 eggs	60	47	
Cereal, cooked and strained	300	2 large servings	6		46
Cream soup	360	2 average servings	10	22	26
Ice cream	600	6 average servings	24	36	84
Sugar	45	3 tbsp.			45
Harris brewers' yeast	90	3 oz.	45	18	27
Total			227	243	354

[6] From James S. McLester, *Nutrition and Diet in Health and Disease,* 4th ed., Philadelphia: W. B. Saunders Co., 1944, pp. 3-36-8.

"SOFT-SOLID" DIET FOR PELLAGRA (Spies, Chinn and McLester)[6]

Food included in one day	WEIGHT IN GRAMS	*Approximate Amount*	PRO-TEIN *(gm.)*	FAT *(gm.)*	CARBOHY-DRATES *(gm.)*
Sweet milk in eggnog, yeast mixture and as beverage	2100	10½ average glasses	69	84	105
Eggs	450	9 eggs	60	47	
Butter	10	1 square		8	
Potato	150	large serving	3		27
Cereal, cooked weight	300	2 large servings	6		46
Cream soup	360	2 average servings	10	22	26
Bread for milk toast	30	1 slice	2		15
Dessert: rice, cornstarch, tapioca or bread pudding	180	2 average servings	8	10	60
Ice cream	300	3 average servings	12	18	42
Applesauce	200	2 average servings			74
Sugar	30	2 1/3 tbsp.			35
Harris brewers' years	90	3 oz.	45	18	27
Total			215	207	457

"SOLID" DIET FOR PELLAGRA (Spies, Chinn and McLester)[6]

Food included in one day	WEIGHT IN GRAMS	*Approximate Amount*	PRO-TEIN *(gm.)*	FAT *(gm.)*	CARBOHY-DRATES *(gm.)*
Sweet milk in eggnog, yeast mixture and as beverage	1900	9½ average glasses	63	76	95
Eggs	250	5 eggs	33	25	
Lean meat	120	4 oz.	28	16	
Butter	60	6 squares	1	51	
Fat: lard or pork used in cooking vegetables and meat	15	1 tbsp.		15	
Potato	150	large serving	3		27
Dried beans or peas, dry weight	30	average serving	6		18
5 or 10% vegetable, cooked	100	average serving	1		5
5% vegetable, raw	100	large serving	1		5
Fruit, stewed or canned	100	average serving	1		10
Fruit, raw	100	average serving	1		10
Bread, white	180	6 slices	16	2	95
Cornbread	60	average serving	6	7	18
Cereal, cooked weight	150	large serving	3		23
Dessert: rice, cornstarch, tapioca or bread pudding	90	average serving	4	5	30
Ice cream	200	2 average servings	8	12	28
Sugar	30	2 tbsp.			30
Harris brewers' yeast	90	3 oz.	45	18	27
Total			220	227	431

DIET RECOMMENDED AFTER DISCHARGE[7]

FOOD	AMOUNT
Sweet milk	1 quart
Eggs	4
Lean meat	¼ to ½ pound
Vegetables: potatoes, butter beans, black-eyed peas and navy beans	2 servings
Other vegetables: spinach, greens, carrots, beets, tomatoes, cabbage, English peas or any other vegetable	2 servings
Fruit, any kind	1 or 2 servings
Bread, any kind	6 slices; 2 slices of cornbread may be used in place of white or whole-wheat bread
Cereal, any kind	large serving

SPRUE

Sprue has been studied most extensively as a disease of the tropics, and until relatively recently nontropical sprue was considered as distinct from it. At the present time most specialists consider the two conditions identical.

For some time the responsible factor was held to be a specific infection, but the newer concept is of a dietary deficiency disease. The factor or factors involved have not been identified, however.

Sprue is a wasting disease. The initial symptoms of mild diarrhea, lack of energy, and loss of weight may be present for days, weeks, or even months before the most severe symptoms appear. These include severe diarrhea with frequent voluminous, frothy, foul-smelling stools containing large amounts of fat, marked emaciation, loss of appetite, and sometimes vomiting. The tongue may be fiery red in appearance or smooth and glossy, according to the degree of atrophy of the papillae. Gastric anacidity may or may not exist. The disease is characterized by severe anemia of the hyperchromic macrocytic type.

Dietary treatment Sprue patients almost invariably give a history of long-continued use of an inadequate diet. Dietary treatment has included recommendations for a high-protein diet low in fat and carbohydrate. Just how specific directions should be in this regard is a question. Diet alone is seldom effective in the cure of sprue. Large amounts of liver give results in some cases. Liver extract given intramuscularly is specific but must be continued for long periods of time and for the

[7] *Ibid.*

remainder of life if danger of a recurrence is to be avoided. With liver extract a patient is able to take a regular diet of well-prepared foods, following the use of a liquid diet for a few days. The fat intake is kept relatively low in the beginning, and fried foods should be avoided. The phenomenal return of appetite with liver-extract therapy soon leaves no question of the patient's ability to eat and digest the standard diet.

Foods to include in a sprue diet

1. Milk (cream removed) 2. Meat, especially liver 3. Green leafy vegetables 4. Fresh fruits 5. Eggs

IODINE DEFICIENCY

Simple Goiter Iodine is a constituent of thyroxine, the active principle of the thyroid gland. When the supply of iodine is inadequate for the production of thyroxine, the thyroid hypertrophies. This is a compensatory mechanism and varies in degree according to the degree of the iodine deficiency. The deficiency may come about through failure of the dietary supply—absolute deficiency; or as a result of increased utilization of iodine beyond the normal supply—relative deficiency.

Simple goiter is more common among females than males, occurring more frequently during puberty, pregnancy, or at the menopause. Goiter is endemic in certain inland regions of the United States, especially around the Great Lakes, where the soil is poor in iodine.

Treatment of simple goiter is by administration of iodine in therapeutic form. Treatment should always be carried out under the direction of a physician, since overdosage may produce hyperthyroidism.[8]

OTHER DEFICIENCY DISEASES

Nutritional Anemia[9] Iron is essential for the building of hemoglobin. An inadequate supply of utilizable iron compounds in the diet may thus result in nutritional anemia. This type of anemia may also come about through inability of the body to utilize its iron supply or as a result of increased demands beyond the range of the normal supply.

Nutritional edema When food supplies are short, body tissue is utilized to meet body needs. Tissue-wasting results from inadequate intake of protein. This may be followed by accumulation of water in the tissues, or edema.

[8] See page 286.
[9] See pages 293-294.

QUESTIONS FOR STUDY

1. What is the cause of xerophthalmia? How may it be prevented or cured?
2. What is the cause of beri-beri? How may it be prevented or cured?
3. What is the cause of scurvy? How may it be prevented or cured?
4. What is the cause of pellagra? How may it be cured?
5. What is the cause of simple goiter? How may it be prevented or cured?
6. Describe the treatment of simple goiter.

21.

MOTHERHOOD [1]

DIET IN PREGNANCY

"Pregnancy is the test of bodily soundness and any organ in the body that functions below par will show the strain imposed upon it. Every part of the mother's body is influenced or affected by pregnancy. The uterus becomes much larger, the breasts enlarge and secrete fluid and the heart seems to enlarge slightly. All mucous membranes are congested, which may account to some extent for the frequency of minor digestive disturbances, though these are probably influenced more by mechanical distention of the abdomen, lessened exercise, increased tendency to constipation and change in diet.[2]

The food intake of the pregnant woman is of great importance. The work of Ebbs[3] clearly demonstrates that we cannot dismiss the subject with the statement that the pregnant woman's needs are the needs of any healthy woman. Many seemingly healthy women are unaware of their dietary needs, and inadequacies become evident during or after a pregnancy. Miscarriages, premature births, sickly infants, and high mortality rates are far more prevalent when the mother's diet is inadequate.

The diet should be carefully planned to furnish all of the known essentials in a form compatible with the habits and economic status of the individual. Those foods which cause distress or discomfort should be avoided. During the early months, palatability may be of prime importance, while during the later months it may be wise to keep the bulk of the meals low, due to increased pressure on internal organs.

[1] This chapter and the two succeeding chapters were revised for this edition by Martha Nelson Lewis, M.S., Director of the Dietary Department, Starling-Loving Hospital, Ohio State University, formerly Dietitian, Department of Pediatrics, State University of Iowa.

[2] G. D. Royston, M.D., "Diet and Pregnancy," in *Journal of the American Dietetic Association,* 3 (1928), 223.

[3] J. Harry Ebbs, M.D., "Nutritive Requirements in Pregnancy and Lactation." Chapter XX, *Handbook of Nutrition,* 1943, p. 335. Amer. Med. Assoc. Pub.

Energy There is little or no increase in the energy requirement during the first 4 months of pregnancy. The old adage, "eating for two," is misleading, as many interpret this to mean that the mother should practically double her intake. During the latter half of the pregnancy the increase is definite but moderate, so that even in the last month the energy requirement of the mother is probably not more than 20 per cent above her nonpregnant needs.

Protein The protein intake of the pregnant woman requires special attention; and in many instances she must be re-educated. Most authorities recommend from 75 to 100 grams of protein daily. It is now recognized that edema and other complications occurring during the latter half of pregnancy are frequently the result of unwise protein restriction. In order to obtain the desired amount of good protein it will be necessary to include 30 to 40 ounces of milk, one or two eggs, and one or more servings of meat in the daily menu.

Minerals It is important that all of the essential minerals be supplied in adequate quantities. If the diet is well balanced and of sufficient quantity and variety, it is probable that most of these minerals will be included in adequate amounts. There are some which, due to the part they play, come in for particular attention.

Iron should be supplied in amounts well above the minimum requirements. The mother needs not only to protect herself from anemia, but to provide the surplus iron for storage in the infant's body.

Iodine is lacking in many localities, and the need for supplement has been pointed out by Curtis and others.[4] The pregnant woman should consult her physician about her need for iodine.

Calcium and *phosphorus* are being laid down in the infant's bones and teeth, and therefore should be supplied in sufficient quantities to prevent a drain on the mother's own stores of these minerals.

Vitamins A deficiency of any one of the vitamins will seriously affect the baby's nutrition. Vitamins B and C are not stored in the body, and the mother therefore has no reserve on which to call. Vitamins A and D can be stored, but it is impossible to be sure that the mother's past diet has supplied sufficient to assure such storage, nor do we know just how much of any of these the unborn child requires. Hence the prospective mother's diet must contain liberal amounts of vitamin-rich foods.

[4] George M. Curtis and M. B. Fertman, "Iodine in Nutrition." Chapter VIII, *Handbook of Nutrition*.

The baby's first teeth are already formed in the gums at birth; and the six-year molars, the first of the permanent teeth to erupt, are beginning to calcify at that time. Strong, well-formed teeth, therefore, are dependent very largely on the supply of calcium, phosphorus, and vitamins C and D during the period of their formation—pregnancy and early infancy. Good bones, a well-shaped body, and normal skeletal development require not only the necessary minerals, but also the antirachitic vitamin D.

Park has written: "Personally I believe that if pregnant women received ample, well-balanced diets, in which green vegetables were abundantly supplied and cow's milk regularly taken, and kept a sufficient part of their time in the open air and sun, and if their infants were placed in the direct rays of the sun for a part of each day and were fed cod-liver oil for the first two or three years of life, more could be accomplished in regard to the eradication of caries of the teeth than in all other ways put together, and rickets would be abolished from the earth."

Roughage and water Enough fruits, vegetables, whole-grain cereals, and breads should be included to aid in the prevention of constipation. Plenty of water—from 4 to 6 glasses daily—should be taken.

Choice of diet If the mother has been accustomed to taking a well-balanced diet, there need be no great change in her food habits—an increase in the amount of milk to one quart or more a day, an additional egg or serving of meat, fish, or cheese, at least 2 or 3 servings of vegetables, always including some of the salad vegetables such as lettuce, cabbage, tomatoes, spinach, and other greens, and 1 or 2 servings of fruit will be sufficient. The rest of her diet will be made up of cereals, bread, butter and other fats, and sugar.

This is an ideal time to give the prospective mother dietary instructions. She frequently is more receptive then to information, due to her concern for her infant. She should be impressed with the fact that she is feeding her child now, just as surely as she will feed him later, and should therefore make every effort to have her diet adequate in every essential.

Number of meals Four or 5 small meals are often more easily eaten and digested than 3 large meals, especially in the last 2 or 3 months, when the pressure of the enlarging uterus and the mother's increasing inactivity may slightly disturb her appetite and digestion.

Nausea in pregnancy Nausea is one of the commonest discomforts of the early months of pregnancy. It is most frequent in the morning

but may occur at any time of day. Some food such as a cup of black coffee, a carbonated drink, or dry toast or crisp crackers should be taken before arising.

Since nausea can be brought on by an empty stomach, frequent eating is desirable. Popcorn, melba toast, pretzels, celery, crisp cookies, sherbets, and carbonated drinks are helpful in many instances.

If nausea persists, the physician may wish to give vitamin and hormone therapy.

Eclampsia The pregnant woman suffering from eclampsia seldom is able to take much food. Blood plasma, amino acids, glucose, or salt solutions may be given intravenously.

Some authorities believe that much can be done to prevent eclampsia by the feeding of an adequate, well-balanced diet during pregnancy. In the pre-eclamptic state, or when the patient is able to take food, a neutral or acid-ash diet is sometimes given. Bread and milk, two slices of bread to a cup of milk, has been found satisfactory.

DIET FOR A NURSING MOTHER

The diet for a nursing mother should be adequate and well balanced. It must provide for her own body needs, plus the large additional demands occasioned by milk production. This means that it must supply an extra amount of those nutrients which will be secreted in her milk—protein, calcium, phosphorus, iron, and vitamins—as well as extra fat and carbohydrate. Unless sufficient nourishment for both is supplied, the needs of the child will be met as far as possible at the expense of the mother's bones and tissues.

Energy[5] In caloric value the food of the nursing mother must be sufficient to meet her own needs and those of her infant, and allow enough for a margin factor of safety. The nutritive demands of lactation exceed those of pregnancy by a wide margin. Gary and Stiven have estimated that approximately 700 calories are expended in the production of 1 liter of milk. When this is added to the woman's own metabolic need of approximately 2400 to 2800 calories, the total energy requirement becomes 3000 to 3500 calories per day.

Roughly, we can say that a nursing mother of sedentary habits should eat as much food as if she were doing moderate work. If in addition to

[5] J. S. McLester, M.D., *Nutrition and Diet*, 4th ed., Philadelphia: W. B. Saunders Co. 1944.

nursing her infant, she is actually working, then she should take as much food as if she were engaged in hard labor.

Value of milk during lactation Milk is the one food which is of greatest value to the nursing mother, not because in itself it stimulates milk production, but because of the high quality of its proteins and its richness in vitamins and calcium. Not less than a quart should be taken daily.

Protein The diet of the nursing mother should provide, in addition to her own requirements, about 2 grams of food protein for every gram of milk protein she produces, or about 0.75 gram additional protein for every ounce of milk secreted. This means from 100 to 120 grams of protein daily, depending on her size.

At least a quart of milk should be taken daily, together with such other protein-rich foods as meat, eggs, and milk products.

Minerals Calcium is the mineral most needed during lactation, both for the baby's requirements and for maintaining the mother's body stores. It is also the one most often lacking. Milk and green vegetables furnish calcium in abundance.

The supply of *phosphorus* and *iron* must also be increased. Milk and eggs will furnish the former, and lean meats, eggs, fruits, and vegetables, the latter.

Vitamins Vitamins in abundance must be provided for the nursing mother, since she must not only meet her own needs for them, but also transfer them through her milk to the baby. The diet should include liberal quantities of the leafy vegetables, such as spinach, lettuce, cabbage, and greens, citrous fruits, tomatoes, and other vitamin-rich foods. The necessity for eating an abundance of foods which supply all the various vitamins cannot be overemphasized. Unlike the other constituents vitamins appear in the milk only when they are present in the diet of the mother.

Water The nursing mother should drink at least 4 glasses of water each day. This will aid in taking care of her extra food and will also help in furnishing the fluid portion of her milk.

Proper care of the nursing mother In order that the increased quantity of food may not disturb the mother's digestion, it is essential that the diet be simple, carefully prepared, and easily digested. All foods known to disagree with her should be avoided. Acid fruits and vegetables eaten by the mother will not give the baby colic nor, unless they upset her digestion, will they affect the milk.

She should, however, avoid fatigue from overwork or lack of sleep, also all worry and emotional excitement of any kind, since these are sure to interfere seriously with the secretion of milk. She should have a moderate amount of outdoor exercise, plenty of fresh air and sunshine, and at least 8 hours of sleep every night. If her rest is broken she should try to make it up during the day when the baby is sleeping.

Dr. Icie Macy writes, "Lack of satisfactory food, exercise, fresh air and sunshine, and a condition of constant mental and physical fatigue of the mother during the prenatal and postnatal periods may manifest their ill effects in various ways. Thus the mother may be unwilling, unprepared or unable to produce satisfactory milk for the entire lactation period. The child, on the other hand, may be so developed that it is unable to derive and utilize all of its requirements from the mother's milk.

"If every healthy mother would make an untiring effort to suckle her young, infant mortality would be greatly reduced. For the welfare of herself and her baby she should be as free as possible from overwork, undue anxiety, excitement and irregularity. In the selection of food it should be borne in mind that only a dietary well balanced in proteins, fats, carbohydrates, minerals and vitamins can satisfy all the demands of the body. Thus the tissues under such conditions may be prepared to elaborate a milk which is adequate in quantity and in which variation from the optimal in chemical and biological properties is at a minimum." [6]

QUESTIONS FOR STUDY—MOTHERHOOD

1. Should the diet during pregnancy differ in any way from the normal diet under ordinary conditions?
2. Are the food requirements of a pregnant woman different in any way from those of a non-pregnant woman? If so, how?
3. Make a list of foods which should be eaten every day during pregnancy.
4. Describe the dietary factors necessary for the development of good teeth in infants.
5. What change in diet should be made for mild cases of vomiting in pregnancy?
6. What is the general treatment for pernicious vomiting?

[6] I. G. Macy, and J. Outhouse, "Breast Milk—A Variable Food," in *Journal of the American Dietetic Association*, 4 (1928), 9.

7. What additions to the ordinary well balanced diet should be made for a nursing mother?
8. Why is milk a valuable food for a lactating woman?
9. What foods should a nursing mother eat to insure the secretion of milk rich in vitamins?
10. Should any foods be avoided during pregnancy? During the nursing period? If so, which ones?
11. Discuss the reasons why rest, sunlight and exercise are important during pregnancy; during the period of lactation.

22. INFANT NUTRITION [1]

BREAST FEEDING

The first year of life is the year of most rapid growth and development. The way in which a baby is fed during this period is the most important factor in keeping him healthy and bringing about his normal development. The milk of a healthy mother, receiving a good diet, is the best food the infant can receive. Babies can be fed satisfactorily from the bottle, but there is always a greater chance of contamination of the food or of inappropriate food being given.

The majority of mothers can nurse their babies at least in part if they will, provided they take proper care of themselves. The right food, plenty of sleep, fresh air, a moderate amount of exercise, the avoidance of fatigue and overwork, and the maintenance of a serene, cheerful attitude of mind are necessary if she is to have a full, normal milk supply.

Colostrum The first secretion of the breasts is called colostrum and, while not a true milk, is adapted to the baby's needs in the first days of his life. The baby should be put to the breast from 6 to 12 hours after birth, according to the condition of the mother and the strength of the baby. He should be nursed every 6 hours during the next 24 hours, nursing both breasts each time. The object of this is partly to give the baby some food and also to stimulate the breasts to secretion.

Because of the low food value of colostrum, the infant should be given a 5 per cent solution of dextrose or beta lactose from a bottle or medicine dropper immediately after each nursing.

Technique of nursing The baby should be held on his side with his head elevated. He must be everywhere supported, so that he is relaxed and comfortable. The breast above the nipple must be pressed

[1] Much of the material included in this chapter will be found in "The Feeding of Healthy Infants and Children," by P. C. Jeans, M.D. *Handbook of Nutrition,* Chapter 8. Amer. Med. Assoc. Pub., 1943. The chapter was revised for this edition by Martha Nelson Lewis, M.S.

away from his nose so that he can breathe freely. The mother must be quiet and composed so that the baby is not disturbed or excited. Every baby swallows some air while nursing, which may cause vomiting, colic, and fretfulness. He should be held over the shoulder before and after every nursing while his back is gently patted until the air is belched up.

The nipples should be washed before and after each nursing with sterile water or a saturated solution of boric acid, carefully dried, and kept dry to prevent their becoming chapped or cracked. If a crack should appear, the greatest care should be taken to prevent infecting the breast lest a painful breast abscess result. A doctor should always be consulted. The cracked nipple should be kept constantly clean by washing it with boiled water. A glass nipple shield should be used, care being taken that it is always perfectly clean and sterilized by boiling. The shield will not materially increase the difficulty of nursing for the baby and will safeguard the mother.

If the breasts become engorged, the discomfort may be relieved by using a breast pump or by manual expression of milk. All such manipulation, however, serves to stimulate the breast to greater activity. Usually the matter rights itself without difficulty as soon as the relation between the supply and demand is established. If the mother has received the proper care during pregnancy and the breasts and nipples have had due attention, the nursing period will be shorn of much of its possible pain and trouble.

Intervals of feeding Most babies do better if the intervals between nursing are fairly long. This is usually every 6 hours for the first 2 days, after which a 4-hour interval is advisable, giving the baby the breast at 2, 6, and 10 A.M., and 2, 6, and 10 P.M.

The 4-hour schedule of nursing offers certain advantages—the baby's stomach is completely emptied before the next nursing, his digestive tract is given more chance to rest, there is less likelihood of vomiting, he nurses more vigorously, and his mother has more time between nursings for her other duties. However, if the breast supply is scanty, more frequent stimulation is sometimes necessary and the 3-hour interval is advisable. It is important that a schedule be adopted, but the schedule for any individual baby should be that which is satisfactory for the infant and for the family in which he lives.

The average baby should not be allowed to remain at the breast over 20 minutes, and the nipple should be withdrawn several times during

the nursing so that he will not take the milk too rapidly with consequent regurgitation. Some babies will obtain enough milk and be satisfied in 10 minutes or less, but a very short nursing period does not always mean that the baby has had enough. He may have emptied the breast if the milk flow is scanty. If the milk is plentiful, the breasts should be nursed alternately; but it may be necessary to give both breasts at one feeding in order to satisfy the baby. Do not let the baby go to sleep while nursing.

It takes from 1½ to 3 hours for a baby's stomach to empty itself after a full meal of breast milk and considerably longer for the process of digestion to be completed in the intestines.

Supplementary or complementary feeding In order to facilitate weaning and free the mother for a portion of the day, some physicians advise the giving of one bottle per day after the first month or two. This will accustom the baby to a bottle and to a milk formula. It is sometimes found that the mother's milk is not sufficient in quantity for the child, and complementary feedings of modified cow's milk must be given immediately after the nursing. The strength and amount of the artificial food to be given depends on the age of the child and the amount of breast milk he is getting. The latter fact is determined by weighing the baby before and after each nursing for a 24-hour period.

When weighing the baby before and after nursing to determine the amount of breast milk he is receiving, do not undress him but weigh both times in exactly the same clothing. If the diaper becomes wet or soiled meantime, do not change it until after the weight has been taken.

Gain in weight The baby usually loses from 4 to 8 ounces during the first week. After that the normal breast-fed infant gains 4 to 8 ounces each week for the first 5 months and 3 to 6 ounces a week during the rest of the year. Smaller but steady gains are not abnormal. A simple rule is that a baby should double its birth weight in the first 5 months and treble it by the end of the first year.

Gains from day to day are irregular. Weigh the baby once a week. Keep a weight record or a weight chart. One weight is not significant, but a weight curve is. A baby's weight is considered normal if it does not vary more than 20 per cent from the accepted standard for an infant of his age.

Additional foods for the breast-fed infant Although breast milk may, if the mother's diet is adequate, supply all the nourishment neces-

sary for the baby for the first few months, it is advisable to supplement the diet with certain iron- and vitamin-containing foods.

Cod-liver oil in the amount of 1 teaspoonful daily, single or divided dose, should be given in the first month and continued in this amount throughout infancy.

The baby should also receive 1 ounce of orange juice daily until the third month and 2 ounces daily therafter. The orange juice should be diluted with an equal quantity of boiled water. The juice of canned tomatoes may be substituted for orange juice, using approximately twice the quantity.

When the infant is 3 months old, egg yolk may be given daily. Suggestions for feeding will be found in the section on artificial feeding.

Fruit and vegetable purées may be added when the infant is 4 to 5 months old. Well-cooked cereals may safely be added as early as 3 months, though many physicians defer them until the other more essential foods have been included.

After 8 months most of the vegetables and fruits should be mashed rather than sieved in order to accustom the baby to new consistencies in food.

Weaning If the supply of breast milk continues adequate, it is usually best to wean the baby between the eighth and twelfth months. The time to wean must be determined by the circumstances in the individual case, depending on the amount and quality of the milk, the drain on the mother, and the time of year. If a baby is doing well it is sometimes advisable to continue nursing through the summer months.

Weaning should proceed slowly, one bottle feeding being substituted for one breast feeding during the day for some time, then two bottles, and so on until all breast feeding has been done away with and the baby is entirely weaned. If drinking water has been given by means of a nursing bottle or if the infant has been receiving one bottle feeding per day during much of the first year the baby will take his food in the same way more readily.

A healthy infant weaned at 9 months should begin with the milk formula for an infant of 5 or 6 months. If he digests this mixture well, the strength can be increased until within a few days he is taking the food full strength.

ARTIFICIAL FEEDING

When for any reason breast feeding is not feasible, or the supply of breast milk is inadequate, bottle feedings may be necessary. With our present knowledge of the nutritional needs of infants and of the physiology of digestion, it is possible to prepare satisfactory feedings using cow's milk as a basis.

Cow's milk Cow's milk differs in composition from human milk in that it contains a larger amount of protein, a smaller amount of sugar, and has different physical properties. The following table shows the average composition:

	HUMAN %	COW'S %
Fat	3.5	3.5
Sugar	7.5	4.7
Protein	1.25	3.4
Mineral matter	0.25	0.75
Caloric value to the ounce	20	20

The difference between human and cow's milk is not only in the proportion, but also in the form of the constituents. The fat of human milk is somewhat more easily digested and contains less of the more irritating lower fatty acids. The protein of human milk is largely lactalbumin, which has a greater nutritive value than casein, the chief protein constituent of cow's milk. The casein of cow's milk forms larger and tougher curds in the infant's stomach than does the protein of human milk. If the milk is first boiled, evaporated, dried, or acidified, however, the curds formed after it reaches the stomach approximate in fineness those from human milk.

Cow's milk has the capacity for neutralizing large amounts of acid. That is, it has a higher "buffer value" than human milk. This is of some importance in digestion because cow's milk tends to neutralize the acid gastric juices. For infant feeding, cow's milk in various forms may be used as a basis.

Bottled milk Milk from a mixed herd of ordinary dairy cattle is preferable to the milk of a single cow or the richer milk from such breeds of cows as Jersey and Guernsey. When bottled milk is used as a basis for the feeding, it should be obtained from a clean dairy and should either be pasteurized or of "certified" grade.

Bottled milk should always be boiled before being fed to infants. Boiled milk is more easily digested by the baby than pasteurized or raw milk and is safe, from the bacterial standpoint.

Milk may be rendered safe by boiling vigorously over a direct flame for from 1 to 2 minutes. Rapid boiling followed by rapid cooling is to be preferred. The film which collects should be strained off through a sterile fine-mesh strainer.

Evaporated milk Evaporated milk is whole mixed herd milk concentrated to about one-half of its original volume and sterilized in the can. It is uniform in composition, sterile, and more readily digestible than raw or pasteurized milk. When evaporated milk is diluted with an equal volume of water it may be used in the same way as bottled milk. Evaporated milk is preferred by many pediatricians for the routine feeding of infants.

Dried milk Whole or half-skimmed cow's milk is obtainable in dried form. It may be reconstituted by the addition of water. Dried milk is digestible and is satisfactory for feeding infants.

Lactic-acid milk When milk is allowed to sour spontaneously, the organisms which produce lactic acid usually outgrow other varieties. Whole lactic-acid milk is prepared by dairies in all of the larger cities and is made up by treating pasteurized milk with cultures of acid-producing organisms.

Such milk differs considerably from sweet milk in its properties. It has a sour taste, and the casein is partly precipitated in the form of a fine curd. This curd is much smaller than the curds formed from sweet milk in the infant's stomach. A considerable portion of the "buffer" substance of milk is neutralized by the acid so that the amount remaining approximates that of human milk. Because of these facts, lactic-acid milk is more readily digested than sweet milk.

Lactic-acid milk may be prepared in the home by the addition of lactic acid to milk. A satisfactory method of preparation is the following:

Place 1 quart of *cold,* previously boiled milk in a bowl and into this stir slowly 1½ teaspoonfuls (6 c.c.) of U.S.P. lactic acid, previously dissolved in 1 or 2 ounces of boiled water.

Whole lactic-acid milk may be prepared from evaporated milk by mixing together equal volumes of evaporated milk and a 1 per cent solution of lactic acid (1 teaspoon of U.S.P. lactic acid to 1 pint of water). The dilute acid solution should be poured into the milk.

Lactic-acid milk may also be obtained in dried form and keeps well. It is prepared for use by mixing with water.

Citric-acid milk Citric-acid milk may be prepared by the addition of a solution of citric acid in the same manner as for the preparation of lactic-acid milk. Two teaspoons of a 25 per cent solution of citric acid may be added to 1 quart of milk. Citric-acid milk is fully as useful as lactic-acid milk and is safter in that an excessive addition of acid through error is harmless.

Orange juice, 3 ounces per quart, or lemon juice, 2 ounces per quart, are used sometimes instead of citric acid.

FOOD REQUIREMENTS OF INFANTS

Energy The total energy or caloric requirement of infants during the first year of life averages from 100 to 110 calories per kilogram, or 45 to 50 calories per pound per day, calculated on the basis of normal weight for the age. Undernourished infants should be fed according to their normal rather than their actual weight. In calculating the caloric value of the formula, the figures used are:

Milk	20 calories for each fluid ounce
Carbohydrate	120 calories for each ounce avoirdupois

Carbohydrate As cow's milk contains less carbohydrate (sugar) than human milk, better nutritional results are obtained by the addition of extra carbohydrate to the milk. The amount of carbohydrate ordinarily used should not be less than 1 part to 20 of milk, nor more than 1 part to 10. The amount added to the total day's feedings will range from 1 ounce during the first few weeks of life to 2 or 3 ounces during the latter part of the first year.

The carbohydrates commonly used as additions to cow's milk are *lactose* (milk sugar), *sucrose* (cane or beet sugar), and *maltose-dextrin mixtures.*

Lactose, or milk sugar, is the sugar occurring naturally in the milk of all species. It is not as sweet as sucrose and for that reason does not accustom the infant to excessive sweetness in his food. It is slightly more laxative than sucrose or some of the dextrin-maltose sugars.

Sucrose has the advantage of being cheap and for general use in infant feeding is satisfactory.

The dextrin-maltose sugars are prepared by the artificial digestion

of starch by enzymes or by acid. Starch itself is only slowly digested by the young infant, but when the digestion has once been started so as to convert it into a mixture of simpler carbohydrates, the resultant mixture is well digested.

One of the best-known and most widely used carbohydrates of this type is Mead's Dextrimaltose. Dextrimaltose consists of dextrin 42 per cent, maltose 51 per cent.

Mellin's Food is of somewhat similar composition but has a higher proportion of maltose; it is a little more laxative, chiefly because of added potassium carbonate.

Corn syrup is also composed chiefly of dextrin and maltose.

Dextrin and maltose are both quickly digested and absorbed. It is for this reason that the dextrin-maltose types of sugars may safely be fed in fairly large amounts and are not likely to produce diarrhea.

One weighed ounce of the sugars used in infant feeding is equivalent to the following amounts in level tablespoons:

Maltose-dextrin mixtures	4	Sucrose	2
Lactose	4	Corn syrup	2

Protein The protein requirement of infants is relatively greater for their weight than that of adults because of the rapid growth of new tissue. The bottle-fed infant requires more protein than the breast-fed infant because the protein of cow's milk has a smaller nutritive value. From 3 to 4 grams of protein per kilogram of normal body weight are needed by the bottle-fed infant.

This amount of protein is supplied if the infant receives from 1.5 to 2 ounces of cow's milk per pound of normal weight.

Fat Fat supplies needed calories, and the fat of milk contains the important vitamin A. It is usually inadvisable to add additional fat through the use of cream and only rarely necessary to remove part of the cream from the milk used.

Minerals Cow's milk is richer in most minerals than human milk and will supply enough of all except iron to meet the infant's needs. Additional iron may be supplied in the form of an egg yolk a day from the third month. Green-vegetable and fruit purées and meat products also contain iron, in a form, however, not so well utilized as that of egg yolk.

Vitamins Cow's milk contains all of the essential vitamins; but certain of them, such as vitamins C and D, in minimal amounts. Further-

more, vitamin C is partly destroyed by heating, consequently extra vitamin-containing foods should be added to the diets of all artificially fed infants. By one month of age, all bottle-fed infants should be receiving 1 teaspoon of cod-liver oil daily. Also 1 ounce of orange juice should be given daily until three months of age, increasing to 2 ounces daily thereafter.

Water Babies require water in amounts of from 10 to 15 per cent of their body weight, or from 100 to 150 grams of water per kilogram (1.5 to 2.5 ounces per pound) per day. Milk goes far toward supplying this need, but cool boiled water should be offered the baby between feedings, especially in hot weather.

FEEDING FORMULAS

Modification of milk The aim in artificial feeding is to adapt cow's milk to the digestive tract of the baby and at the same time provide an adequate supply of fuel, protein, minerals, and vitamins.

There are a number of methods of modifying milk, and authorities differ as to their preference. A few of the fundamental points are given here, but it should be understood that whenever possible a doctor should be consulted regarding the diet of an artificially fed infant. Each baby is an individual case in his capacity for and reaction to food and must be treated accordingly.

Whole sweet-milk formula A simple method of preparing the formula is by the dilution of whole milk and the addition of carbohydrate in sufficient amount to meet the energy requirements of the infant.

A simple method of calculating the milk formula for an average healthy infant is to start with the amount of cow's milk which will furnish an adequate quantity of protein. As has been stated, this will be from 1.5 to 2 ounces of milk for each pound of normal body weight.

A well-nourished infant 2 months old, weighing 10 pounds, would thus require not less than 15 ounces of milk. If his caloric requirement is calculated at a minimum of 45 calories per pound, this would amount to 450 calories.

The milk, at 20 calories per ounce, would furnish 300 calories, leaving 150 calories to be made up by carbohydrate. Since each ounce of carbohydrate has a caloric value of approximately 120, 1¼ ounces would meet the need.

There is still to be determined the amount of diluent. An infant at the age of 2 months can usually take about 4 ounces at each feeding. Nine ounces of water would therefore be added. The formula would then be:

	OUNCES	CALORIES
Whole milk	15	300
Sugar	1¼	150
Water	9	. . .
Total	24	450

This amount would be divided into 6 feedings to be given during the day. This would represent the minimum feeding and might have to be increased if the infant were hungry or not gaining sufficiently rapidly. Many babies do better if they receive 1¾ to 2 ounces of milk and 50 or more calories for each pound of body weight.

Using a similar basis of calculation, the following table gives the average formulas and amounts of feeding on which infants at various ages might be started.

FEEDING SCHEDULE FOR AVERAGE BABIES

SWEET-MILK FORMULAS

Age	*Weight in lbs.*	*Cow's milk fluid ounces*	*Boiled water fluid ounces*	*Sugar ounces avoirdupois*	*Amount per feeding fluid ounces*	*No. of hours between feedings*	*No. of feedings in 24 hours*
1 week	7	8	8	1	2½	4	6
2 weeks	7	10	8	1	3	4	6
1 month	8	12	11	1	4	4	6
2 months	10	15	9	1½	4	4	6
3 months	11	17	8	1½	5	4	5
4 months	13	20	10	2	6	4	5
5 months	14	22	8	2	6	4	5
6 months	15	24	4	1	7	4	4
8 months	17	30	4	0	8	4	4
10 months	19	32	0	0	8	4	4
12 months	21	32	0	0	8	4	4

Preparation of the day's feedings In preparing the milk formulas, the total day's feedings are made up at one time. The sugar is measured

by level tablespoonfuls, or weighed, and dissolved in the water, the milk measured and mixed in. The whole mixture is then sterilized by boiling in a saucepan 1 to 2 minutes. Any scum is then strained off and the milk, while still hot, is poured into sterile nursing bottles, one for each feeding. The bottles are stoppered with wads of nonabsorbent cotton, corks, or rubber caps, cooled by immersion in water, and placed in a refrigerator until needed.

Acidified-milk mixtures The method of making acidified milk has already been described. Because of the easier digestibility of acidified milk, the formula, when this is used, does not need to be diluted as much as when feeding sweet milk. In preparing the formula, the sugar is simply dissolved in the milk before it is acidified and the mixture bottled.

It is not necessary to sterilize the feedings after they are prepared, and heating to the boiling point causes curdling.

Before the bottles are given to the baby, however, they should be warmed to body temperature. Since acidified milk mixtures are very thick, the holes in the nipples must be made larger than when sweet milk formulas are fed.

Articles required for preparing formulas Everything that is to be used in the preparation of the baby's food, including the hands and clothing of the mother or nurse, must be clean. The best possible milk should be bought.

There will be needed a measuring cup, a funnel, a cream dipper, a flat-bottomed pan and long-handled spoon, nursing bottles, a tall cup in which the bottle may be surrounded by hot water and warmed, rubber nipples, bottle brushes, boric acid, and absorbent cotton.

The best style of bottle is that which can be most readily cleaned. The graduated cylindrical bottles with wide mouths are good. Better still is the nursing bottle that has no neck and a breast-nipple so natural that the baby can be weaned without a struggle, or will take the milk in conjunction with the natural supply.

The best nipples are those of plain black rubber, which slip over the neck of the bottle and are not so thick as to prevent their being turned inside out for cleaning. The hole in the nipple should be large enough for the milk to drip rapidly when the bottle is inverted but not so large that it will run in a stream. New nipples should be boiled, but daily boiling is unnecessary except in institutions. They should be rinsed in cold water immediately after using and washed occasionally in soap

and water. When not in use, nipples should be kept covered in a solution of boric acid.

Directions for feeding The food should be warmed to about 100° F. This is best done by placing the bottle in a tall pitcher or cup filled with hot water, *not* by pouring the food from the bottle into a saucepan. The temperature of the food may be tested with a thermometer or by pouring a few drops upon the front of the wrist; it should feel warm but not hot. A bottle should not be warmed over for a second feeding.

A child should not be more than 20 minutes in taking his food and should not sleep with the nipple of the bottle in his mouth. The infant should be held while taking his bottle. This is desirable as a safety measure and also promotes the social development of the infant.

After feeding, the child should be held upright over the nurse's shoulder and patted on the back to allow him to bring up the air which he has swallowed. He is then placed in his crib and left alone. It is necessary, as in breast feeding, that rules as to frequency and regularity of meals be observed.

Additions to the daily diet The additions to the milk diet of the artificially fed baby are practically the same as for the breast-fed infant. Egg yolk should be added at about 3 months of age. This may be added to the formula, may be hard-cooked, mashed with a fork, and moistened with milk, or may be made into a soft custard (1 egg yolk, ½ cup milk, 1 teaspoon sugar, pinch salt). Fruit and vegetable purées and cereals should be added one at a time until by the time the baby is 6 to 7 months old the daily diet will follow a pattern similar to that given below.

6:00 or 7:00 A.M.:
  2 or 3 tablespoons cooked cereal. 8 ounces milk.

Midmorning:
  1 teaspoon cod-liver oil. 3 ounces orange juice.

10:00 or 11:00 A.M.:
  2 or 3 tablespoons vegetable purée. 8 ounces milk.

2:00 or 3:00 P.M.:
  1 egg yolk (hard-cooked and mashed or in custard). 8 ounces milk.

6:00 or 7:00 P.M.:
  2 or 3 tablespoons fruit purée. 8 ounces milk.

CONDITIONS REQUIRING SPECIAL FOOD VARIATIONS

Feeding during hot weather The infant needs less food during very hot weather, as his digestive capacity may be somewhat decreased. At the same time the appetite is less. Acidified milk is a suitable food for use during hot weather because it is not readily contaminated by bac-teria and because it is easily digested. The digestive disturbances during hot weather are due chiefly to bacterial contamination of the food. As there is a much greater evaporation of water from the body during warm weather, extra water should be supplied, and the infant should be offered water frequently and given all he will take readily.

Teething In the majority of instances, teething does not cause gastro-intestinal symptoms. There may be a temporary loss of appetite, and the infant may be wakeful and irritable. If fever and diarrhea or vomit-ing occur at this time, the cause is much more likely to be some form of infection rather than the teething process. No change in the char-acter of the food is necessary because of teething, though it may be necessary because of coincidental illness.

Vomiting The most frequent causes of vomiting are: (1) distention of the stomach by swallowed air, (2) too-frequent feeding, (3) too much at a feeding, (4) gastric irritation from unsuitable food, (5) in-fections.

All young infants swallow a certain amount of air. When food i taken into a stomach already containing air, the total volume of foo and air may be sufficient to distend the stomach. Expulsion of a par of the contents results.

Vomiting is much more frequently observed in infants who are fe at short intervals than in those fed at 4-hour intervals. A vomitin baby should not usually be fed more often than every 4 hours.

If the food is vomited in spite of long feeding intervals and sma volumes at a feeding, the infant should be refed immediately aft vomiting or the feeding thickened by the addition of 12 per cent barle or rice flour. When prepared in this way it should be boiled for minutes. The mixture should be so thick that it will not fall from a inverted spoon. It cannot be fed from an ordinary nipple or from bottle, but must be given from a spoon or from a large-sized nippl the tip of which has been cut off so as to leave a hole a little small than a lead pencil. The nipple is placed in the infant's mouth and th food pushed into the tip by means of a spoon or a glass rod. Acidifie

milk mixtures can be satisfactorily thickened in this way, since the milk does not curdle when boiled with starch as it does when boiled by itself.

In the presence of acute infections, vomiting is a frequent symptom. Infants suffering from infections of the ear or of the genito-urinary tract are especially likely to vomit. Such vomiting is often taken as an indication that the food is unsuitable. This is an error. If the food has previously agreed with the baby and if vomiting occurs accompanied by fever, there is usually no need for changing the character of the food. A physician should be consulted and the source of infection found and properly treated. When this is done, the vomiting will cease without changing the formula.

Colic Colic is more common during the first 3 or 4 months of life than later. The infant with colic screams with pain and draws his legs up. The abdomen is usually rigid and the extremities cold. The pain of colic is due to increased peristalsis caused by indigestion or by contractions due to hunger.

Underfed babies usually swallow a large amount of air, which probably contributes also to the discomfort. Constipation also may be a factor for some infants. Gross overfeeding, especially with large amounts of easily fermentable sugar, is an occasional cause.

The treatment consists in the proper regulation of diet to avoid the errors mentioned.

Diarrhea Infants are more likely to develop diarrhea than are adults, and the effects are more serious. There are numerous causes of the diarrhea of infants. It may be due to contamination of the food with harmful bacteria, to overfeeding, especially with large amounts of sugar or fat, or to decreased digestive capacity resulting from fever or hot weather. Undernourished infants are especially likely to develop diarrhea. Babies nursed at the breast rarely suffer from severe or fatal diarrhea.

The best means of preventing diarrhea is to give suitable food to meet the nuritional requirements, yet avoiding an excess of any constituent, to make sure that all food that the baby takes is properly sterilized, not to overclothe the baby in hot weather, and to give him a sufficient amount of pure water.

When diarrhea occurs, all foods should be stopped and liberal amounts of water given. The physician should make a careful examination of the baby to determine whether or not any infection in the ears,

nose, throat, or elsewhere is present, which may be the underlying cause of the diarrhea. If such infection is found, it should be treated properly.

The length of the period of starvation will vary, depending upon the severity of the diarrhea and the condition of the infant. In a mild diarrhea, unaccompanied by fever, the omission of one or two feedings may be all that is necessary. In the very severe types of diarrhea (cholera infantum) food may have to be withheld for a day or two.

When feedings are resumed, the most satisfactory form of food is some type of acidified milk, or a special preparation known as *protein milk* may be used.

Protein milk can be obtained in dried form, and needs only to be mixed with water before using. When mixed with the proper amount of water its composition is: fat, 2.5 per cent, sugar, 1.5 per cent, protein, 3.5 per cent. Because of its low sugar and fat content and its acidity, it is well tolerated.

Either acidified milk or protein milk is started first in small amounts and then gradually increased over a period of days. No sugar is added at the start, but as the diarrhea improves small amounts of sugar are added, preferably in the form of dextrose or one of the dextrin-maltose mixtures. Gradually the regular feedings for the age are resumed.

Constipation Constipation results when there is an insufficient stimulus to peristalsis, when the intestine fails to respond to a normal stimulus, or when the food residue is of such a nature as to form firm, hard masses, which are expelled with difficulty.

The normal stimulus to peristalsis is food, especially readily fermented carbohydrate; hence an insufficient amount of total food or of fermentable carbohydrate will cause constipation. A food which contains a large amount of casein and fat and little carbohydrate results in the production of considerable quantities of insoluble calcium and magnesium soaps in the intestine. These do not stimulate peristalsis but tend to collect in firm, puttylike masses. In some babies the intestinal tract seems to be sluggish in its response to stimuli.

Constipation is more frequent in artificially fed infants because of the larger amount of protein in proportion to the amount of sugar present in the food. The stools of artificially fed infants are firmer and fewer in number than are those of breast-fed infants. This in itself does no harm unless there is marked abdominal distention or vomiting and unless the fecal masses are too large or dry to be expelled without

difficulty and pain. It may be advisable to increase the total food intake of the infant or to add more vegetables and fruits.

In the very young infant, an increased amount or different type of sugar may prove helpful. Malt-soup extract may be substituted for part of the sugar. Mineral oil and laxatives should be avoided.

Undernourished infants Infants who are underweight as the result of improper feeding or disease need almost if not quite as much total food as normal infants of the same age. Unfortunately such infants are not always able to digest the amount of food required. It is therefore very important that the food should be easily digested. For this purpose the mixtures of acidified milk and sugar are preferable to sweet-milk dilution formulas. Undernourished infants are often unable to take as large a volume of food as normal infants of the same age. The food must therefore be more concentrated. Acidified milk may be used, as it can be fed undiluted.

With underweight infants it is generally advisable to give 6 feedings a day in order to introduce more food. The number of calories *per pound* required per day is usually much greater than in the case of normal infants, although the total caloric intake may be about the same. Thus an infant 6 months of age weighing 10 pounds will require about the same number of calories as the normal infant (700 per day), and this in the case of the poorly nourished infant will mean 70 calories per pound (150 calories per kilogram), as contrasted with the allowance of 45 calories per pound (100 calories per kilogram) for the normal diet.

The prevention of malnutrition is much easier than the cure. An adequate diet and the proper treatment of diarrhea are the most important measures. If a baby is losing weight, an attempt should be made to discover the cause. Underfeeding or unsuitable feeding should be corrected and infections should be treated.

Once the condition has developed, the infant should be given a sufficient amount of food to cover his needs but not more than he can digest. Many undernourished babies will not begin to gain until they are given as much as 200 to 300 calories per kilogram (100 to 150 calories per pound) of body weight. Their digestive capacity is poor, however, and often they cannot digest enough sweet cow's milk to meet their food requirements. Whatever food is given them must be relatively concentrated because malnourished infants vomit readily when given large quantities of fluids.

QUESTIONS FOR STUDY

1. Of what advantage is breast-feeding?
2. What is colostrum?
3. Discuss the technique of breast-feeding.
4. How often should the baby be nursed?
5. How much should a baby gain in weight during the first five months? During the first year?
6. What additional foods should be given every infant?
7. When and how should the baby be weaned?
8. Compare cow's milk with human milk.
9. Discuss the use of bottled, evaporated, and dried milk in infant feeding.
10. What is lactic-acid milk?
11. What other forms of acid milk are sometimes used?
12. What is the energy requirement of infants during the first year?
13. Name some carbohydrates used in infant feeding.
14. Discuss the baby's requirement of protein, fat, minerals, vitamins, and water.
15. How is a whole sweet-milk formula calculated?
16. Discuss its preparation.
17. What changes in the infant's dietary are advisable during extreme hot weather?
18. What may cause vomiting in a baby? How would you treat such a condition?
19. What would you do to combat diarrhea? Constipation?
20. Discuss the treatment of undernourished infants.

23.

THE FEEDING OF YOUNG CHILDREN [1]

The baby normally has been weaned by the ninth month. He is already accustomed to orange or tomato juice, cod-liver oil, cereal, strained vegetable pulp, and egg yolk. As the teeth appear he should have toast, stale bread, or zwieback to exercise his gums and teeth and teach him how to chew.

DIET FOR THE SECOND YEAR

By the time he is a year old he can usually take about a quart of whole milk undiluted, 2 to 4 tablespoonfuls of thoroughly cooked cereal, 2 to 3 tablespoonfuls of strained fruit, 2 to 3 tablespoonfuls of cooked vegetable pulp, 1 egg yolk, either mixed with his milk or hard-cooked and grated, and zwieback or crisp cracker.

The diet for a child during the second year should include:

Milk One quart a day. This will supply a large part of his requirement for energy, protein, calcium, phosphorus, and vitamins and is easy to digest.

Cereals Cooked and served with milk. Finely divided whole-grain or enriched cereals should be used.

Orange juice 2 to 3 ounces given between meals.

Egg yolk One a day. Methods of feeding egg yolk were mentioned in the previous chapter. During the second year the whole cooked egg may be used. Eggs may be boiled, poached, or coddled. The egg white should be thoroughly coagulated.

Bread Must be at least a day old, thoroughly toasted, zwieback, or crisp white or graham crackers.

Vegetables [2] Such vegetables as spinach, peas, string beans, carrots, potatoes, and asparagus tips, should be staples in the diet. The liking for vegetables can be brought about by first using each vegetable as a flavoring in milk. These should be cooked and mashed, seasoned with

[1] This chapter was revised for this edition by Martha Nelson Lewis, M.S.

[2] Commercial strained foods offer an attractive and safe way of serving vegetables to infants, also chopped foods for older infants and young children.

a little salt, and served either plain or thinned with milk. They are valuable for their minerals and vitamins, and it is important that children be taught early to eat all kinds.

Fruits Applesauce, prune purée, stewed peaches or pears are the fruits most suitable for the young child.

From this short list of foods the requirements of the child for energy, protein, minerals, and vitamins can be met. Meat is a useful source of proteins of good quality, and of phosphorus and iron. Egg yolk and milk are equally efficient sources of protein and phosphorus, and egg yolk and liver are rich in iron. All three are good sources of vitamin A. Vitamin D should be supplied in form of cod-liver or halibut-liver oil or milk fortified with it unless sunshine is abundant at all seasons of the year.

Number of meals Sometime during the second year the child will be ready for a three-meal-a-day schedule. No set rule can be followed as some children are able to take the necessary food in three feedings much earlier than other children.

Children at this age frequently like to take small pieces of food in their hands and "take a bite." Such procedures and attempts of the child to feed himself should be encouraged.

A sample diet for a two-year-old on 3 meals a day is given.

Breakfast:
- Orange pulp or apple or prune sauce
- Cereal (cooked in milk)
- Buttered toast or zwieback, 1 slice
- Milk, 8 oz.

Dinner:
- Poached egg or ground liver
- Small baked potato with butter and salt
- Cooked vegetable, 2 or 3 tbsp.
- Bread and butter or zwieback, 1 slice
- Milk, 8 oz.

Supper:
- Cooked vegetable or vegetable or cream soup
- Buttered toast or crisp crackers
- Stewed fruit or ripe banana or orange pulp
- Milk, 8 oz.

Between meals:
- 1 tsp. of cod-liver oil, juice of 1 orange in midmorning or on retiring.

THE PRE-SCHOOL CHILD

The food of the child after the second year becomes more varied, though it may not materially increase in quantity as the child now grows much more slowly. One by one the foods consumed by the family (provided the family consumes a proper diet) are added to the child's diet.

There is a tendency for the mother to be overly strict in the feeding of the infant and to pay little or no attention to the diet of the run-about child. The child's early feeding experiences are the foundation on which are built many of his later life patterns. It is a wise parent or nurse who knows how to assist the child to develop good eating habits.

Meat now appears daily. Very tender roasts, finely chopped, boiled calves' liver, flaked fish, scraped beef patties, or crisp bacon are allowed.

Shredded lettuce, crisp celery, thin slices of raw carrot or apple are enjoyed by the child, as he likes to hold them in his fingers and eat them bite by bite.

The addition of pastries and sweets to the diet should be deferred as long as possible, for they will dull the appetite and make the child less eager for his meals.[3]

DIET PATTERN FOR THE PRE-SCHOOL CHILD

Breakfast:
- Orange sections or other fruit
- Cooked cereal with milk
- Egg or crisp bacon
- Buttered toast
- Milk, 8 oz.

Dinner:
- Meat or fish or egg
- Baked potato with butter
- Buttered vegetable

Dinner (cont'd)
- Few leaves of lettuce or celery heart
- Simple pudding or custard
- Milk, 8 oz.

Supper:
- Soup or rice or cereal
- Stewed fruit
- Bread and butter, 1 slice
- Milk, 8 oz.

Cod-liver oil and orange juice may be given at breakfast, on retiring, or at any convenient time during the day.

[3] For further information, see Mary E. Sweeny and Marian E. Breckenridge, *How to Feed Children in Nursery Schools,* the Merrill Palmer School, 1944.

THE SCHOOL CHILD

The foods in the dietary of the school child differ not at all from those of his family. When the child eats at the family table, he will eat the same foods the rest of the family are having. The only way to make this safe for the child is to provide a family dietary on which the child can thrive. The Nutrition Programs Branch of the War Food Administration recommends the Basic Seven dietary plan (see page 122).

The school lunch[4] In many cases the child must carry his noon meal to school. A box lunch must be planned with thought and carefully prepared if the child's good digestion and health are to be maintained. The choice of foods is necessarily limited and monotony difficult to avoid, yet with care some variety is possible. The following suggestions are offered for box lunches to be carried from home:

Sandwiches White, graham, whole-wheat, raisin, rye, and brown bread or crisp crackers may be used.

Fillings may be:

Peanut butter Thinned with salad dressing, cream or honey.

Nuts Ground or chopped finely and mixed with salad dressing. Finely chopped celery, dates, or raisins may be added, or cottage or cream cheese.

Lettuce Spread with a little salad dressing.

Lean meat Beef, lamb, tongue, ham, chicken, sliced thin or chopped and moistened with salad dressing.

Fish Salmon, tuna, or sardines, moistened with salad dressing or lemon juice.

Eggs Hard-cooked and chopped and mixed with a little salad dressing.

Cheese American, cottage, cream, or pimento.

Jelly Of various kinds.

Other foods:

Fruit Apples, bananas, oranges.

Prunes and dates Plain or stuffed with cheese or nuts.

Cooked fruit Baked apples, stewed prunes, or other cooked fruit without too much juice can be carried in custard cups or waxed-paper containers.

[4] Consult also Rowena S. Carpenter and Helen N. Hann, *Food for Children,* U. S. Department of Agriculture, Farmers' Bulletin No. 1674, Washington, D. C., 1939.

Cake Plain or sponge cake. Better not rich cake with frosting.

Puddings Rice, bread, cornstarch, tapioca cream and fruit tapioca, and other simple puddings packed in custard cups.

Milk Milk may be carried in small bottles or thermos bottles.

Crackers White or graham crackers.

Cookies Plain, oatmeal, and molasses.

SAMPLE MENUS FOR LUNCH BOXES

1. Plain bread and butter sandwiches
   Prunes stuffed with nuts and cottage cheese
   Apple
   Cup custard
2. Peanut-butter sandwiches
   Lettuce sandwiches
   Cup of applesauce
   Oatmeal cookie
3. Brown bread and cottage cheese sandwiches
   Celery, with small package salt
   Dates
   Peach tapioca
4. Chopped-meat sandwiches
   Jelly sandwiches
   Baked apple stuffed with nuts and raisins
   Sponge cake

Hot dishes served at school The child's lunch from home is greatly improved if it is supplemented by one or more hot dishes served at school. The following is a list of hot dishes intended to supplement the lunch brought from home. It will be noticed that nearly all of these contain milk.

Suggestions for simple hot dishes which can be prepared with limited equipment and a small expenditure of time:

Vegetable soup
Cream soups—corn, celery, tomato, bean, baked bean, potato, pea, spinach, etc.
Macaroni and cheese
Macaroni and tomatoes
Rice and cheese
Rice and tomatoes
Scrambled eggs
Creamed eggs
Eggs goldenrod
Boiled rice or tapioca with raisins
Cornstarch pudding
Milk toast
Cocoa

The undernourished child The seriousness of this problem may be understood when we realize that some 30 per cent or more of American school children are estimated to be undernourished.[5] The child needs food sufficient to supply both his high daily need for energy and also his requirement for growth, and unless he receives his full daily quota regularly he cannot develop properly.

Nutritional standards for children are still somewhat uncertain, but there is small doubt that any child who is 15 per cent under the normal weight for his height and age is undernourished and in need of special dietetic care, while a child 10 per cent underweight is probably not in his best physical condition. It is always better for a child to be a little overweight than underweight.

The undernourished child, strangely enough, has less appetite than one would expect. Loss of appetite may result from unfavorable home surroundings, fatigue from overexertion in play and from insufficient rest, or from some physical defect such as enlarged or diseased tonsils and adenoids, infected teeth, or a tubercular condition.

These conditions, if found to exist, should be corrected as speedily as possible. The child should receive an adequate daily allowance of calories, and care should also be taken that he has plenty of minerals and vitamins, particularly of vitamin B. The diet must be well balanced in order not to upset his digestion, and meals should be served as attractively and tastily as possible in order to stimulate his appetite.

Fresh air, sunshine, and rest are also essential in bringing the undernourished child up to the level where he should be.

DIET FOR THE ADOLESCENT

The period of adolescence is one of rapid development in many ways for both boys and girls. Boys especially are growing fast and as a rule are very active, hence their energy requirement is large, sometimes as high as 3500 to 4500 calories, or more than is required by many full-grown men. Girls need less fuel than boys but often as much or more than their mothers and have a special requirement for iron due to loss from menstruation. The diet for both girls and boys should be simple and varied and should include liberal amounts of milk and meat, as well as green vegetables and fruits. Rich pastries and hot breads should be avoided.

[5] See page 367.

Regularity of meals is still important, and the taking of candy, sodas, etc., between meals should be discouraged. Children should never be allowed to omit breakfast. It is impossible to meet the high food requirements of childhood with less than 3 meals a day, and when breakfast is omitted undernutrition is a frequent and natural result.

The appetite of young girls at this time is often poor or capricious. They may develop a distaste for cereals, milk, and other plain foods. Much may be done to tempt the girl to eat the foods which should be a part of her diet by serving them in attractive forms. Salads are almost always acceptable, and a great variety of vegetables and fruits may be used in this way. The flavor of milk may be changed by serving it as cocoa or flavored with cereal coffee, or in puddings of various kinds such as tapioca, rice, and bread puddings, ice creams and sherbets, cream sauce for vegetables, or by cooking breakfast cereals in milk instead of water. The addition of chopped dates, raisins, or prunes to cereals often makes them more acceptable to girls. Attention to color, garnishes, and attractive ways of serving foods is necessary, and a great deal may often be accomplished by interesting the girl herself in the importance of eating wisely for her own health.

QUESTIONS FOR STUDY

1. What foods constitute the baby's soft diet? Give a day's menu.
2. What foods should make up the diet of the child during the second year?
3. Why is milk so important a food throughout the period of growth?
4. Suggest five ways in which milk can be served to children of school age.
5. Why are vegetables important in the child's diet?
6. Name four vegetables suitable for children under four years old.
7. Discuss the use of meat in the child's diet.
8. Discuss the formation of good food habits.
9. Suggest the type of food to be included in a child's school lunch.
10. What dietary rules apply to the period of adolescence?

24.

DIET IN YEARS AFTER THE PRIME OF LIFE

During the early years of life and through the period of adolescence, it is important that the diet contain a plentiful supply of those nutrients essential for growth. Requirement values for most nutritive essentials according to age groups reach a maximum for the adolescent and are somewhat in excess of the values estimated for the adult. After full growth has been reached, the dietary requirements for the adult are assumed to be fairly constant, except for such special conditions as pregnancy and lactation.

With advancing years there is a gradual slowing up of bodily activities—a lessening of the rate of metabolic processes. Old age in relation to these changes is not so much a matter of length of time one has lived as it is of physiologic condition. Many factors influence this state, not the least of which is the nutritional state of well-being of the individual, which may be largely the result of his dietary habits throughout life.

Too little is known about the dietary requirements of individuals beyond the reproductive age to make specific recommendations as to diet apart from those made for the average adult in good health. The relatively recent introduction of the term "geriatrics," referring to the study of diet in old age, is proof of this. The first concern must still be that the diet supply an adequate amount of each of the essential nutrients. In the past it has been generally recommended that the protein intake be reduced. There is little or no basis in fact for this recommendation, and it seems best merely to stipulate that the use of protein foods in excess should be avoided.

With advancing years through middle life, the chief problem comes in the case of those individuals who experience a more or less abrupt change from an active to an appreciably less active life, requiring an adjustment in food intake according to energy needs. The food habits of years are not easily changed, and a healthy appetite does not neces-

sarily diminish as activity becomes less. There is an all too common tendency to accept increase in weight at middle age as within the normal course of events rather than a matter for serious concern from the standpoint of health. The dietary changes needed to keep the weight within the normal range should be made gradually, always taking care that the diet is adequate.

For the really aged, the meals served should contain foods that are simply prepared and easily digested. For some individuals small amounts of food served more frequently than the regular 3 meals a day may be advisable. A midmorning or a midafternoon lunch with a hot drink at bedtime and small quantities of food at the regular meals is suggested.

The lessened activity and lowered rate of metabolism of the aged make it more difficult to keep the body warm. It is therefore better to serve food and beverages hot rather than cold. This does not mean that anything cold is to be excluded. Individual preference should be considered.

Suggested foods for the aged The following foods may be used in feeding the aged:

Milk Served hot or cold, in weak cocoa or *café au lait,* ice cream, custards, cereal puddings, or cream soups.

Lean meats and fish These may usually be eaten once a day. Bacon is also allowable. Clear soups and broths are stimulating and refreshing and may be used unless meat extractives are contraindicated. If there is a tendency to intestinal putrefaction, meat of all kinds is usually best excluded.

Eggs In all ways except fried.

Cereals Thoroughly cooked. If mastication is possible, crisp shredded-wheat biscuits, cornflakes, etc., may be served.

Bread Preferably toasted. Freshly baked bread and hot breads of all kinds should be excluded.

Vegetables Almost any kind unless they are found to disagree. Onions, turnips, cooked cabbage, and beans are likely to cause flatulence and are therefore better excluded. Purées form an excellent way to serve vegetables.

Fruits Mild ripe fresh, or thoroughly cooked. It may be necessary to strain them or to give only the juice and pulp. Orange or tomato juice should be served daily. A small daily dose of cod-liver oil may be beneficial.

Number of meals A suggested schedule for meals is:

Breakfast	7:30 or 8:00 A.M.	Light lunch	3:00 or 4:00 P.M.
Dinner	12:30 or 1:00 P.M.	Supper	6:00 or 6:30 P.M.

A cup of hot milk, tea, or broth on retiring.

Sometimes a cup of coffee or tea early in the morning before arising is helpful, as is also a cup of broth with a few crackers between breakfast and lunch.

A DAY'S FOOD PLAN FOR AN ELDERLY PERSON [1]

(Fuel requirement: 1500-1800 calories)

Age: 70-80

	CALORIES
7:30 A.M.:	
Soft, sweet fruit, or mild fruit juice	75–100
Well-cooked cereal with added wheat germ, thin cream, and a little sugar	100–200
Toast or zwieback with butter	100–200
Bacon or soft-cooked eggs	75–150
Tea or coffee with cream and sugar	100–200
12:30 P.M.:	
Cream soup	100–150
Fish or oysters, cheese soufflé or fondue	100–200
A green vegetable, cooked soft	10–25
Rice or baked banana, white or sweet potato	75–100
Toast or zwieback with butter	100–200
Stewed fruit or fruit jelly with gelatin or tapioca	100–200
4:00 P.M.:	
Tea, coffee, tomato bouillon, or malted milk, with toast or crackers	75–150
6:00 P.M.:	
Chicken, lamb chop, or broiled beef balls	100–150
Riced, baked, or mashed potato	75–100
One other cooked vegetable (soft enough to mash with a fork)	25–100
Toast, zwieback, or dinner biscuit	75–100
Custard, cereal pudding, or ice cream	100–200
Tea or coffee with cream and sugar	100–200

For persons of 80 or over, the caloric content may be reduced to from 1200 to 1500 calories. A cup of weak coffee or tea or a glass of warm milk

[1] M. S. Rose, *Feeding the Family,* 4th ed., New York: The Macmillan Company, 1940.

or malted milk may be given at 6:00 A.M., and a cup of broth with toast just before retiring.

QUESTIONS FOR STUDY

1. Outline dietary rules for feeding in old age.
2. How does the food requirement of the aged differ from that of the active adult?

PART THREE

THE PRACTICAL APPLICATION OF THE PRINCIPLES OF NUTRITION

25.

FEEDING THE SICK[1]

In the treatment of disease there are few questions which must be considered so often in the daily routine of practice as those which concern the proper nourishment of the patient.

The careful serving of suitable and easily digested food is essential, for it is from this that the patient derives the energy and the building and regulating materials which his body requires. In feeding the sick the nurse by co-operating carefully with the physician and the dietitian has unlimited opportunity to benefit the patient.

Methods of feeding The natural method of feeding is by the mouth. Certain conditions, however, compel a resort to artificial means, either by gavage or forced feeding in the case of a semiconscious or sometimes an unruly patient, or by rectal or intravenous feeding in cases where the patient is too weak to take nourishment in any other way.

AIDING THE PATIENT'S DIGESTION

Selection and preparation of food for the sick Only the choicest and most tempting foods should be chosen for the sick. Foods with a strong flavor, such as onions, cabbage, cauliflower, and turnips, should be used cautiously. Excessively sweet foods, such as jams, jellies, preserves, candies, and very sweet desserts, should be given sparingly. Condiments and spices should be used as little as possible, while burned food, rancid fats, and other irritating foods should never be served.

Foods may be more quickly and easily digested if:

1. Given in liquid form—milk, broths, raw eggs, fruit juices, cereal gruels.
2. Solids are finely divided—by scraping or chopping meat and by chopping or mashing vegetables.

[1] This chapter was revised for this edition by Miss Henderika J. Rynbergen, assistant professor of sciences, Cornell University, New York Hospital School of Nursing, New York City.

3. Given in bland form—by straining out cellulose and large particles from such foods as cereals and vegetables. Also by using finely milled rather than coarse cereals.
4. Properly cooked—with proteins and cellulose softened and fats not decomposed by high temperature.

Large quantities of protein and fat retard digestion, while cellulose delays the passage of food from the stomach into the small intestine.

Digestion is also furthered by serving small quantities of food frequently and regularly. Warm food is easier to digest than cold, dilute easier than concentrated. Hot foods should be served hot, but cold foods should not be ice cold.

Thirst must, of course, be alleviated, giving water regularly and freely. In some cases, as peptic ulcer, only a meager amount of fluids may be administered with safety. In typhoid fever it is wise to learn the beverages which the patient prefers and to make use of them whenever possible.

With an adequate supply of the best quality of pure, fresh food and a physician's regulation as to the amount for each feeding, the nurse's task is not difficult. If the doctor makes no rule in the matter, the nurse must see to it that the patient eats enough without overindulging.

If disease is wasting the body, extra food is needed. During convalescence additional food may be served to enable the patient to regain lost weight.

Feeding in acute diseases In an acute disease accompanied by fever, urea excretion is increased and energy is expended at a higher rate than in health, necessary fuel being supplied by body fat or tissue if food is not available, with consequent loss of body weight.

This loss of body substance is not dangerous if permitted for a few days only and if the amount lost does not exceed certain limits. But in replacing this loss we meet the difficulty of the patient's lowered ability to assimilate or even to retain food.

It is just as important, therefore, to avoid giving unsuitable food as to guard against giving nourishment in quantities and at times unsuited to the digestive powers of the patient. One should not give what cannot be digested nor more than can be assimilated. So the nurse must keep constant watch over the condition of the patient's digestion, not only as to what is put into the alimentary tract but also as to what goes out, such as curds of undigested milk, etc. She must know how to choose

such variety in the diet as will include both what is palatable and what will afford a proper amount of nourishment.

DETAILS OF FEEDING

The room The room in which the food is to be served to the patient should be clean, orderly, and free from the noise and smell of cooking or other odors.

Bathing and cleansing the mouth The patient's face and hands should be bathed before offering food. If the patient is not strong enough to rinse the mouth before and after eating, the nurse should do so with a swab.

In any febrile condition the mouth may acquire a disagreeable taste, so prominent sometimes as to render it difficult for the patient to eat. This can be eliminated to a great extent by the use of mouth washes.

Time and position for feeding The principal meal of the day should be served when the patient is allowed to sit up for a half-hour. If unable to sit up, he should be made as comfortable as possible while eating and should never be cramped by the food tray.

It is well to remember that the chronically ill patient eats his best meal at breakfast, when he is rested; and least well at supper, when he is tired. If the patient is very ill and easily exhausted, he may be fed 6 small meals a day.

The rule of serving food at stated intervals should be observed for the semiconscious as well as for the conscious patient.

The appetite The patient's surroundings should be cheerful. If his appetite is poor, he should not be asked what he would like to eat nor should he see or hear others eating or even tasting food in his presence.

His personal tastes should be considered lest some easily digested food which is repugnant to him prove nauseating and either disturb digestion or be rejected entirely.

Great pains may be necessary in choosing, preparing, and serving food to tempt a languid appetite. Because the body has been depleted of some of the essential food factors by poor food intake over a period of time, the judicious use of vitamin preparations may be of help in stimulating the appetite of the chronically ill, the old, or the convalescent patient. Vitamin B particularly has this effect. Vitamin preparations should be given only at the doctor's orders.

Food should be served as soon as ready. Many properly cooked foods

which would be delicious if served promptly are rendered unappetizing if allowed to stand.

Sleep and feeding Food should be administered regularly in serious cases, even though it be necessary to wake the patient. However, if he should be unable to fall asleep readily after the feeding, sleep would very likely be more beneficial than food.

Feeding the helpless patient If the patient is very weak, the feeding process may be made less wearisome by placing the hand beneath the pillow and raising the patient gently.

In feeding fluids, always serve in a small tumbler not more than two-thirds filled. See that swallows are not taken during inspiration and that each mouthful is swallowed before another is offered. In case the head cannot be raised, food may be given by means of a glass tube or a feeding cup.

Although hot fluids should be served hot, be careful that they are not so hot as to burn the patient's mouth.

Feeding the semiconscious patient Semiconscious patients demand special care in feeding. They should be given only liquid nourishment and fed with a spoon or through a catheter. If the jaws are set, a medicine dropper may be utilized. Not over a teaspoonful should be given at once, and the nurse must be sure it is swallowed before she gives more. Gavage is sometimes resorted to when mouth feeding is not feasible. Nasal gavage may be used in the case of comatose children or young infants.

The foods best adapted to this use are some of the milk, cream, and lactose mixtures recommended for typhoid fever patients, to which beaten raw eggs or thin cereal gruel may be added. The intervals between feeding should be as long as possible, preferably not oftener than 3 times in the 24 hours. The caloric needs of the individual must be considered in arranging the exact quantity to be used in the 24 hours.

ARTIFICIAL METHODS OF FEEDING

GAVAGE OR FORCED FEEDING

Forced feeding—i.e., introducing various liquid foods, as milk, eggs, meat juice, or extracts into the stomach by way of the nose or directly through the mouth by means of a stomach tube—is seldom required of the nurse, being done usually by the physician. This method may be

employed when the patient is unconscious, in gastric irritability, when a patient is unable to take sufficient food owing to loss of appetite and disgust for food, and also in case of a refractory patient who refuses to eat.

Technique of nasal feeding In nasal feeding, a nasal tube is employed or, in the case of an infant, a catheter. Have either well lubricated and pass gently through the nose into the esophagus and then into the stomach.

Technique of gavage The jaws must be kept open. In children without teeth, the finger may be employed; in grown persons a mouth gag or a roller bandage may be held between the teeth. It is assumed that all artificial dentures have been removed. The tube should be *moistened,* placed as far back on the tongue as possible to stimulate the swallowing reflex, and, when swallowed, passed rapidly into the stomach. Unless these precautions are observed, contraction of the muscles may occur, preventing the tube from entering the esophagus. In passing the tube into the esophagus, hold it well back from the end.

When the tube is satisfactorily introduced, place a funnel in the free end and pour liquid nourishment slowly down the side of the funnel until the tube is filled and the air in the tube is expelled. This care prevents air from entering the stomach. In removing the tube, withdraw it rapidly but carefully in order not to excite vomiting. In some cases the physician orders the stomach washed out before introducing the food.

Technique of duodenal feeding[2] The object of duodenal feeding is to supply nourishment to the patient in such a manner that the stomach is kept empty. This can be done by introducing a small tube into the stomach, whence it passes of itself into the duodenum and is left there.

RECTAL FEEDING[3]

The nutrient enema This form of feeding is necessary when the stomach cannot retain food or when it is considered desirable to rest the stomach and small intestine by reducing or eliminating their activity. It is based on the fact that the mucous membrane of the colon, while it possesses no digestive faculty, is absorptive to a certain degree.

[2] For further information see Max Einhorn, M.D., *Lectures on Dietetics,* New York: Paul B. Hoeber.

[3] Based on J. S. McLester, M.D., *Nutrition and Diet in Health and Disease,* 4th ed., Philadelphia, Pa.: W. B. Saunders Co., 1944.

It is never possible, however, to supply more than a small part of the nutritional requirements of the patient in this way.

Absorption of protein There is little or no utilization of protein given by rectum. Present-day opinion classes as useless the older formulas for rectal feeding, which included such proteins as milk and eggs. Something may be accomplished by giving commercially prepared amino acids or skimmed milk which has been peptonized for a full 24 hours. However, the value of even these has still to be demonstrated.

Absorption of fat The nutritive value of fats given by enema is doubtful. They are probably of little if any value. Alcohol in a solution not over 2 per cent is readily absorbed and is utilized.

Absorption of glucose Glucose is commonly believed to be promptly absorbed from the colon and readily utilized. Recent experiments would indicate, however, that this is not true and that such absorption as takes place occurs in the small intestine.

The glucose enema appears, then, to have no nutritive value unless the ileocecal valve, which normally prevents food from passing back into the small intestine, is incompetent. This, fortunately, seems to be the case in a large proportion of sick people.

The available facts, then, would indicate that it is seldom if ever advisable to include in the nutrient enema anything other than water, glucose, and sodium chloride.

Glucose may be given as pure dextrose or as corn syrup, but solutions stronger than from 5 to 10 per cent may cause discomfort.

The most satisfactory form of rectal nourishment is a 5 per cent solution of glucose in tap water. This may be given in daily injections of a pint each or continuously by the Murphy drip. By the latter method as much as two quarts of fluid may be administered daily under favorable circumstances. This will carry comfortably from 100 to 150 grams of glucose with a value of from 400 to 600 calories. The solution should be kept reasonably warm and should flow at from 30 to 40 drops per minute.

Technique of rectal feeding The ordinary enema should be given with the patient on his left side or with the foot of the bed elevated. The tube, well lubricated, should be inserted 5 or 6 inches. The vessel containing the fluid should not be more than 2 feet above the level of the nozzle. The fluid should be given warm. When abdominal distress is caused or the enema cannot be retained, the addition of about 10

drops of laudanum will often give relief. A cleansing enema of physiologic salt solution should be given once each dav to keep the rectum clean.

INTRAVENOUS FEEDING

Intravenous feeding of glucose, saline, and some of the vitamins is in common use today. For the most part it is used post-operatively, during the period when the patient can take little food or fluid by mouth. It is also used for feeding the unconscious patient.

A steady search had been going on for an amino-acid mixture which could be given intravenously and supply some of the protein needs of the body. Several commercial preparations are on the market now; and this addition to the maintenance of good nutrition in the patient will undoubtedly be widely used.

Since intravenous feeding is essentially a nursing procedure, as against a dietetic procedure, nothing is said here of how to administer it.

THE TRAY

The writer's intention is only to suggest to the nurse the best and simplest methods of arranging the tray and a few of the important details. These things may seem of small importance, but the patient who is confined to his bed thinks much of his immediate surroundings, and his meals are the chief events of the day; therefore too much care cannot be bestowed upon their preparation and service. One feeds with the eyes quite as much as with the palate, and some carelessness on the part of the nurse may entirely destroy the appetite of a refined, fastidious, or nervous patient.

ATTRACTIVE ARRANGEMENT OF A TRAY

The cover and the arrangement of the tray are of the utmost importance, and the slightest departure from regularity and immaculate cleanliness must be avoided. The following rules should be observed:

Linen The cover for the tray and the napkin should be absolutely clean, without crease or wrinkle, and of the best quality you can afford. Paper tray cloths and napkins of good quality are available, and may be preferable in cases of infection or where it is not possible to afford linen.

Silver Use the choicest silver, clean and well polished. Warm slightly in cold weather as the chill of cold silver may spoil a delicate appetite.

China and glassware Use the daintiest china and glassware. The china should be arranged neatly and conveniently and warmed for hot foods. The arrangement should be the same at all meals, enabling the patient to find anything without trouble. It should be as nearly as possible like that of the conventional meal service to which the patient has been accustomed.

General notes and instructions When possible, divert the patient's mind while he is eating by introducing cheerful and interesting topics of conversation. Business, disagreeable subjects, or a noisy radio must be rigidly excluded.

A fresh flower adds materially to the attractive appearance of the tray and should be provided whenever possible. If there is room for a small vase—as indicated on the dinner-tray diagram—take care to choose one with a broad base so that it cannot easily be overturned.

The water glass has been omitted from each of the three trays illustrated, in order to prevent crowding. It is assumed that fresh water and a drinking glass are kept constantly on the invalid's bedside table so that an additional glass on the tray would be superfluous.

The use of an individual sugar bowl and cream pitcher, which can be obtained in nearly all glassware departments, effects a material saving in space.

In arranging silver, the various pieces should be placed in the order in which they will be used, starting at the point farthest from the plate on either side.

Knives have the cutting edge turned toward the plate; spoons and forks are laid face up.

Forks are arranged in order at the left with the exception of the oyster fork, which is placed at the right of the soup spoon.

Spoons are laid at the right except those for beverages and desserts, which may be laid across the rim of the saucer or desert plate respectively if it is necessary to save room.

Butter spreaders are placed on the rim of the bread and butter plate, as in Diagram II, or on the tray if space allows.

Not more than 3 knives and 3 forks may be included in the "cover." If additional silver is required, it is placed at the right when serving the course for which it is to be used or on the plate containing the food, as mentioned above.

Small napkins are correct for breakfast, luncheon, or supper. Large ones should be used for dinner if they are available.

BREAKFAST TRAY (16″ x 22″)

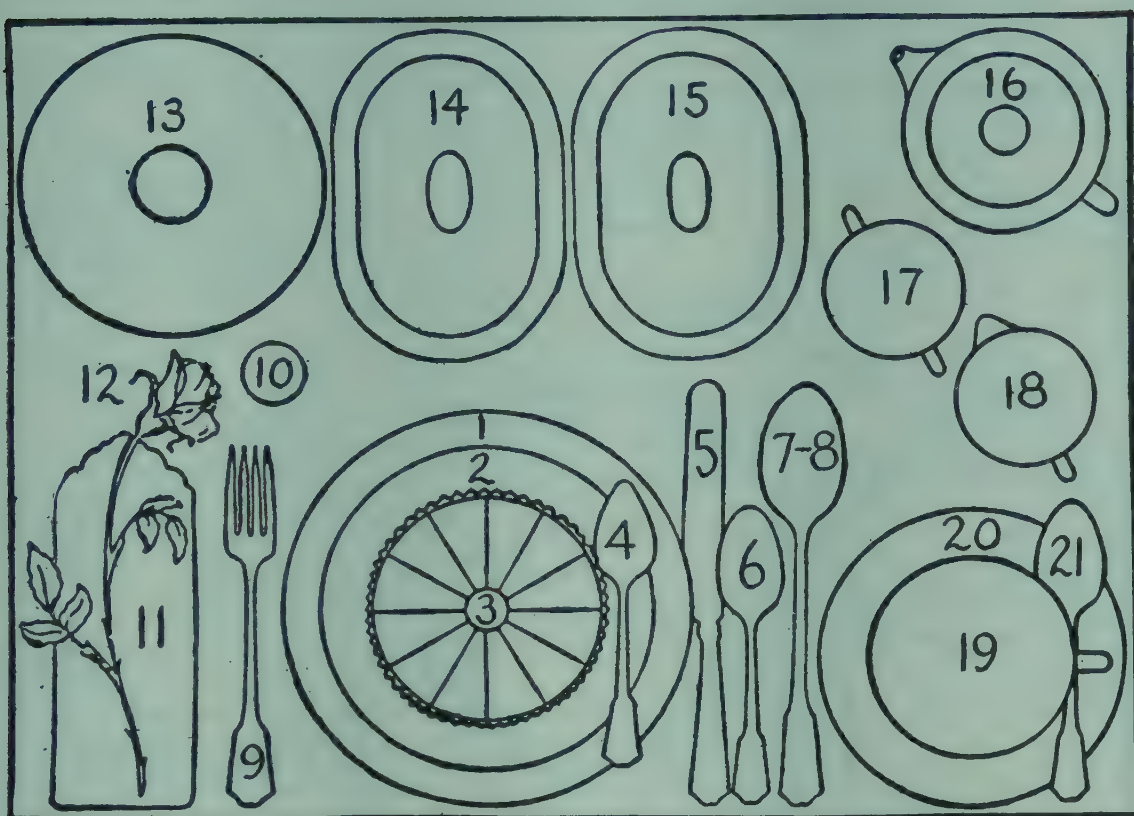


Diagram I

1. Breakfast plate
2. Fruit plate
3. Grapefruit
4. Fruit spoon
5. Breakfast knife
6. Cereal spoon

7–8. Two serving spoons, one nested in the other

9. Breakfast fork
10. Individual salt
11. Napkin
12. Single flower
13. Covered toast plate temporarily nested on top of empty cereal dish
14. Covered nappy containing hot cereal
15. Covered nappy containing hearty course
16. Individual coffee or chocolate pot

17–18. Individual sugar and creamer

19–20. Cup and saucer

21. Teaspoon

VARIATIONS

1. When the fruit course consists of grapes, the fruit spoon may be omitted. If apples or peaches are served, a fruit knife should replace the spoon.

2. Should a baked apple or stewed fruit be served with the meal instead of the regular fruit course, the cereal dish may be filled, covered, and set in the breakfast plate; and the individual dish of cooked fruit may then replace the covered nappy number 14.

3. In case no knife is required for the hearty course, it may be

omitted and the fork—or the egg spoon if a boiled egg is served—placed at the right of the plate. The egg, in an egg cup covered with a cozy, would then take the place of the covered nappy number 15.

LUNCHEON TRAY (16″ x 22″)

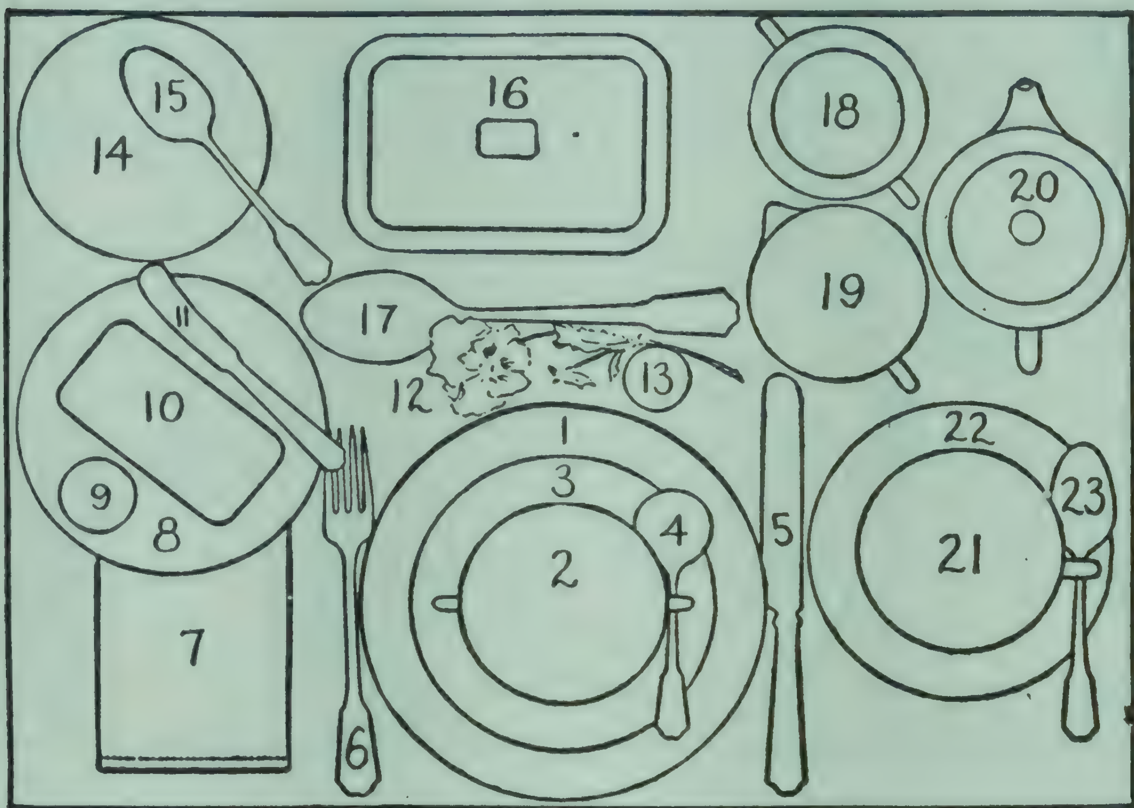


DIAGRAM II

1. Luncheon plate
2–3. Bouillon cup and saucer
4. Bouillon spoon
5. Knife
6. Fork
7. Napkin
8. Bread and butter plate
9. Butter ball or pat
10. Roll
11. Butter spreader
12. Single flower
13. Individual salt
14. Dessert plate or pudding saucer
15. Teaspoon
16. Covered nappy for hearty course
17. Serving spoon
18. Individual sugar bowl
19. Individual creamer
20. Individual teapot
21–22. Teacup and saucer
23. Teaspoon

VARIATIONS

1. As in the case of the breakfast service, the knife may be omitted when not required and the fork laid at the right of the plate.

2. Should the hearty course consist of a salad, it may be arranged either in a small salad bowl or on an individual plate, replacing the covered nappy number 16. A salad fork would then take the place of the luncheon fork.

DINNER TRAY (18″ x 24″)

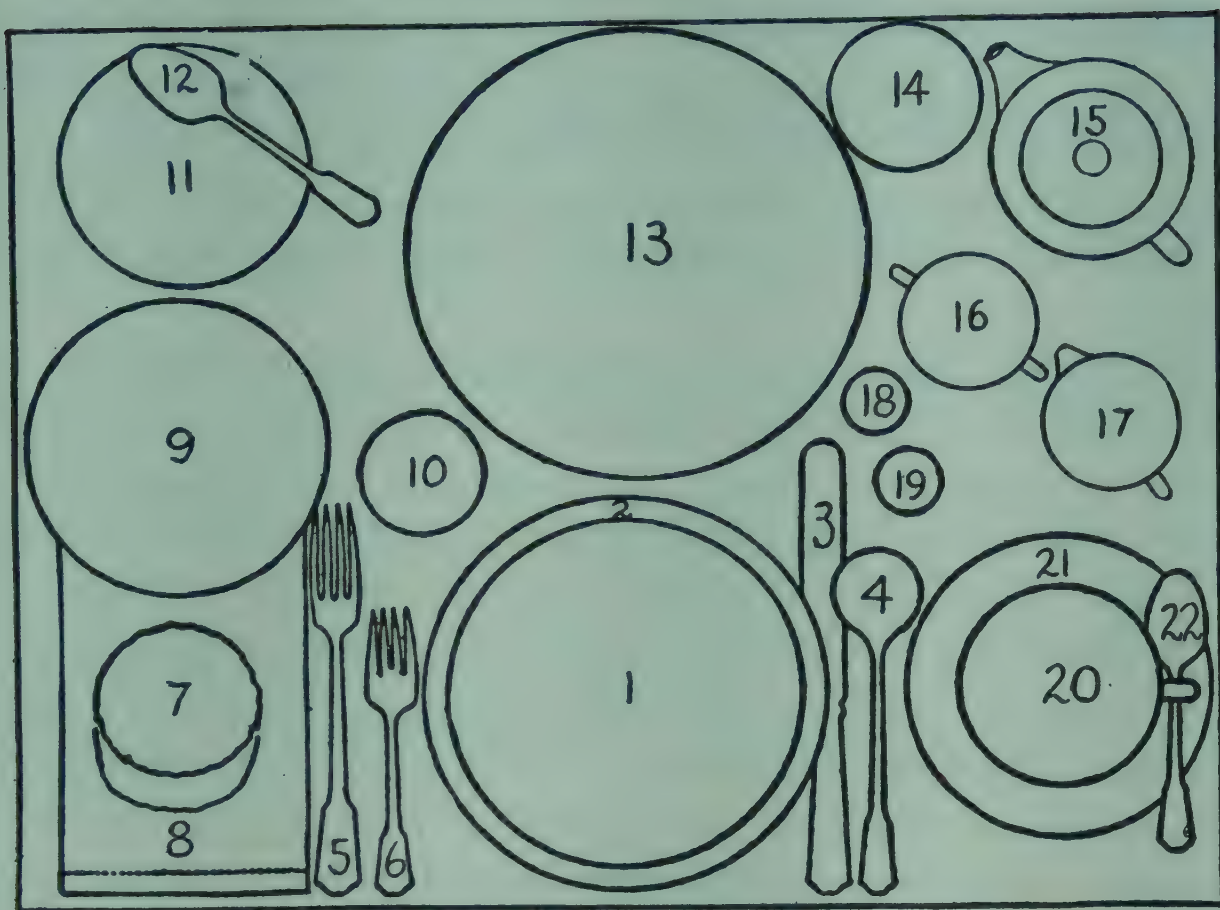


DIAGRAM III

1. Soup plate
2. Service plate
3. Dinner knife
4. Soup spoon
5. Dinner fork
6. Salad fork
7. Dinner roll
8. Dinner napkin
9. Salad plate
10. Butter plate
11. Dessert plate
12. Teaspoon
13. Dinner plate
14. Vase
15. Individual tea or coffee pot

16–17. Individual sugar bowl and creamer

18–19. Individual salt and pepper

20–21. Cup and saucer

22. Teaspoon

VARIATIONS

1. In the "plate dinner" type of service illustrated in the diagram, the meat or fish is arranged with the vegetables on the dinner plate, which is covered with a second hot plate if no metal cover of suitable dimensions is available, thus effecting a saving in space.

If this method is not approved, however, the dinner plate may replace the service plate beneath the soup service and the hearty foods may be arranged in covered dishes as illustrated in Diagram II.

2. For cream soups, a cream-soup server is preferred. This is somewhat smaller than a soup plate, has handles, and stands in its own small plate. Bouillon cups, however, should never be used for dinner.

FORMAL DINNER SERVICE

Occasion will seldom be found to serve a complete formal dinner on a tray, but it is well to understand the principles by which such service is governed, as they supply the foundation of all other forms.

The correct order of courses for an elaborate dinner is as follows: *hors d'œuvres,* soup, fish, entree, roast, game, salad, sweet ices, fruit, and coffee.

Following the rule that only 3 forks may appear on the table in advance, the *hors d'œuvres* fork, fish fork, and meat fork are shown in the diagram. Were melon or oysters to constitute the first course, the order of forks from left to right would be fish, entree, and meat. The oyster fork is not counted as one of the 3, because laid at the right of the plate. In either case only 2 knives would be in evidence, because neither the *hors d'œuvres* nor the entree should require the use of a knife.

The salad fork and, in the form of service illustrated, the entree fork, would be placed when the corresponding food was served. In tray service they should be placed on or beside the dishes containing these courses, in order to save room.

It would, of course, be impossible to arrange a 6- or 7-course dinner on a tray, even in the form of single portions. The only solution would be to arrange the cover and the opening course on one tray and the remaining courses on a second.

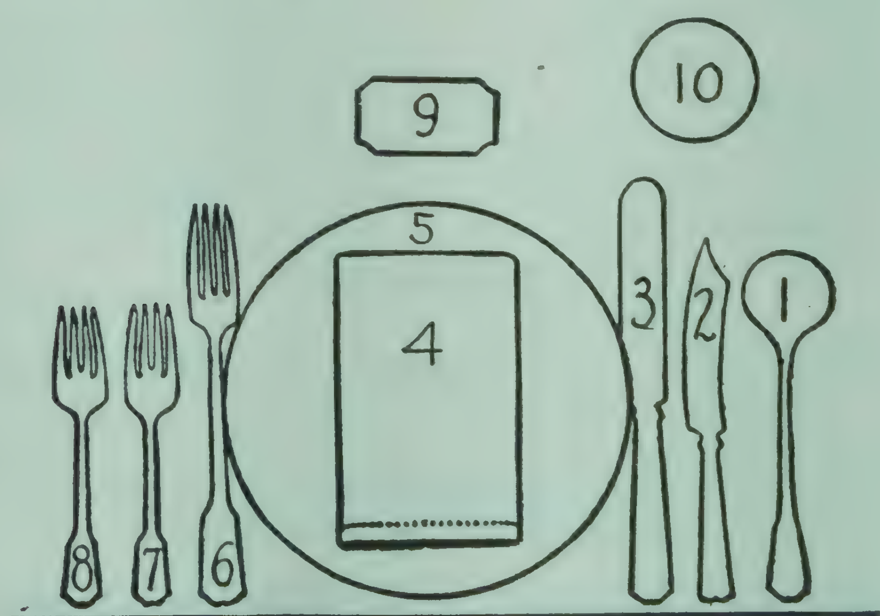


DIAGRAM IV

1. Soup spoon
2. Fish knife
3. Dinner knife
4. Napkin
5. Dinner plate
6. Meat fork
7. Fish fork
8. *Hors d'œuvres* fork
9. Individual nut dish
10. Goblet

VARIATIONS

1. Oysters, usually served as a cocktail, may replace the *hors d'œuvres,* although considered less smart.

2. A sherbet is sometimes served between the roast and game courses, or with the game.

3. The salad may accompany the game if desired, the sherbet being omitted.

4. At less elaborate dinners, the roast and game courses are sometimes combined in the form of capon or guinea hen, and the entree is likely to be omitted.

The bread and butter plate is omitted at the formal dinner, together with the butter spreader, and the dinner roll is placed on or in the napkin and eaten without butter. At informal dinners, however, butter is usually served since most people prefer it.

The napkin may be laid either on the service plate or at the left of the forks.

HOW TO SERVE

1. The time of cooking food should be carefully considered in relation to that of serving for the most palatable food may be spoiled by allowing it to stand after being prepared.

2. Cover the tray with a clean napkin or tray cover in carrying it to its destination. Avoid serving too many things or too large portions. When the nature of the dish permits, it may be garnished with a sprig of green. When the dietary ordered is very limited in variety, the patient is often gratified and will eat more by having his food served in courses.

3. If possible, taste all foods and drinks before serving to see whether they are properly seasoned and at the right temperature to serve. Always use a separate spoon for tasting.

4. Hot food should be served hot. Lukewarm food is nauseating. Cold drinks and fruits are not so likely to distend when served cool rather than ice cold.

5. When liquid foods are to be given, other receptacles should be used than those used for medicines, or the association of ideas may be strong enough to destroy what little appetite the patient has and even to produce nausea. Fill cups and glasses to within 1 inch of the top—not full. For individual dishes, for a luncheon, or for drinks to be served

alone, use a small tray or plate, covered with a doily or folded napkin.

6. Cover all foods and drinks left standing in the sickroom. Half-emptied cups or glasses should never be left in the room.

7. The finger bowl, one-fourth full of water, should be placed on a small plate covered with a dainty doily, with a few rose petals or green leaves in the bowl or on the plate.

8. The tray and all traces of a meal should be removed immediately after eating. Care must be taken, however, not to hurry the patient at his meal or to give the impression of haste, for with a nervous patient this may cause loss of appetite or indigestion.

9. The diet of the patient should be under the supervision of the physician and his directions followed implicitly. The nurse should make out the "diet sheet" for the day for all special cases requiring special diets and vary the food as far as possible in the preparation and serving. In hospitals the diet sheet is passed on to the dietitian, who carries out the directions laid down by the physician.

The nurse should carefully check the tray, for mistakes sometimes occur and giving the wrong food to a patient suffering from certain disorders may cause much unnecessary suffering or even death.

QUESTIONS FOR STUDY

1. What are the advantages of a liquid diet in feeding the sick? What must be guarded against?
2. What may be done to stimulate a patient's appetite?
3. Why is it important to cleanse the patient's mouth before and after eating? How should this be done?
4. Would you wake a patient to feed him?
5. How would you feed a helpless patient?
6. How would you feed an unconscious patient?
7. When is forced feeding necessary? What methods are used?
8. Outline the procedure to be followed in the use of the stomach tube. What precautions must be taken?
9. When is rectal feeding used?
10. How far is it possible to nourish the patient in this way?
11. Calculate the number of calories supplied in 24 hours by three glucose enemas containing 30 grams of glucose each.
12. What is the purpose of intravenous feeding? What foodstuffs are commonly used?

13. What is gained by scrupulous care in the arrangement of the tray and the serving of food?
14. Mention at least five points which you consider important for the nurse to remember when serving the patient's meals.
15. Is there any advantage in serving the meal in courses?
16. When but one thing can be given a patient, how would you present it most attractively? Illustrate.
17. Why is a standard arrangement of dishes desirable?

26.

THE CARE AND PREPARATION OF FOOD[1]

SELECTION AND CARE OF FOOD

Selection of food All foods administered to either the sick or the well must be of good quality and known purity. That is, they should be bought in the freshest and cleanest condition, placed in clean containers, and handled with clean hands. Special attention to fly pollution is necessary—buy only from reliable dealers where food has been kept in properly screened stores or markets. Purchase foods where you are sure that your desire for purest and best foods will be respected.

The windows in kitchens and rooms where food is prepared and served must be properly screened and the rooms kept free from flies.

Care of food The care of food between the time of purchase and that of cooking and serving is highly important for two reasons: First, spoilage represents an economic loss. If good food is purchased but poorly prepared or badly cared for, it means that the cost of food as eaten may be easily 2 or 3 times the purchase cost. One need only examine the garbage pails of some of our public institutions to be convinced of the force of this statement. Second, if good food is contaminated with germ life, it may easily lead to food poisoning.

Dust from city streets abound in germ life, therefore vegetables and fruits which are to be eaten raw should be washed in one or several waters.

Food exposed to dust, insects, etc., may become contaminated with disease germs without becoming spoiled.

Cooking thoroughly—broiling, roasting, or boiling—kills most of the bacteria but is usually ineffectual in removing the products of decomposition or in making them ineffective. Ordinary boiling does not kill all kinds of bacteria; most are readily killed, but some resist even pro-

[1] This chapter was revised for this edition by Miss Henderika J. Rynbergen, assistant professor of sciences, Cornell University, New York Hospital School of Nursing, New York City.

longed boiling. *Bacillus botulinus* and its poison and the bacilli of the Salmonella group may be fatal if ingested. Boiling 30 minutes kills both of these organisms and destroys their poisons.

In the case of substances which have a natural protective covering, it is highly important that this should not be broken in handling. When fruits and vegetables are bruised, the pulp is quickly attacked by micro-organisms, and local changes occur, resulting in economic waste, since only part of such articles can be utilized.

Foods should be stored in places which admit plenty of sunlight and air, for these elements tend to inhibit the growth of molds and putrefactive bacteria. Refrigeration is a valuable aid, for it induces a temperature unfavorable for the growth of micro-organisms.

Food should be eaten as soon as convenient after cooking and should not be kept for long intervals. If necessary to keep food over, it should be properly stored in a refrigerator or other cool place.

Food poisoning Food poisoning is due to the presence or formation of certain chemical substances which may be present alike in raw, cooked, frozen, fresh, or preserved foods. Most cases of food poisoning are caused by bacterial infection of cooked food improperly stored or refrigerated.[2] Personal susceptibility is often a factor in fish poisoning.

Sound, fresh food, thoroughly cooked and eaten at once, seldom causes poisoning under any conditions. The articles which the careful nurse must be cautious of in this connection are preserved foods of all kinds, chicken, shellfish, and milk products, the latter being of most significance, since milk, fresh cream, ice cream, etc., are often given freely to invalids.

Special care in order to avoid fly pollution is necessary because of the part played by this insect in causing typhoid fever, cholera, dysentery, etc. Both the feet and the excrement of flies are sources of contamination. Flies are much more likely to abound in neighborhoods where garbage and other refuse is allowed to accumulate.

Cooking and careful washing of food that is to be eaten raw are the principal safeguards in respect to food as it is brought to the house by the dealer in foodstuffs. Then, too, the food when ready for consumption may be freshly contaminated. In order to avoid this, food must be carefully protected and covered until served.

If typhoid is epidemic in a neighborhood, it is well to avoid raw food

[2] See Harley A. Haynes, "Food Poisoning, What May Cause It and What May Prevent It," in *Modern Hospital,* 44 (March 1935), 118.

entirely as a precaution, just as everyone today avoids unsterilized water and milk.

Preserving of food Foods to be preserved should be perfectly fresh. The five following methods are in general use:

1. Dehydration.
2. Canning.
3. Exclusion of air by dipping in wax.
4. Freezing and cold storage.
5. Antiseptics, as smoking, salt, vinegar, alcohol, syrups, benzoate of soda.

The small amounts of preservative used in certain canned and bottled foods probably has little if any effect on the individual.

Concentration Many foods can be reduced to a dry or otherwise condensed state without danger of decomposition. Sugar, oil, starch, and many cereal products are already in a state of concentration. Powdered, condensed, and evaporated milk, egg powder, and other concentrated foods are coming more and more into use, as have already dried and evaporated fruits and vegetables. The chief use of many condensed products as mainstays will doubtless be in cases of temporary shortage of fresh foods, due to devastating storms, war, and other causes. With present methods of dehydration, there seems to be considerable loss of vitamins B and C.

Canned goods Canned goods should never be used if the can is seen to have a convex top, as this is always due to imperfect sterilization with resulting fermentation and putrefaction, the bulging being caused by the gas under pressure. These cans are called "swells" or "blows." It is well also not to purchase cans that appear rusty, as they may be very old stock and hence may be spoiled.

Adulteration of food Adulterated food should never be served. All articles should be of the best quality and purchased from a reliable dealer. Special care should be taken as to the purity of milk, butter, cream, and canned goods. The Federal Food, Drug, and Cosmetics Act of 1938, which supersedes the 1906 act, guards against adulteration of foods sold in interstate commerce. Many states and municipalities have laws of their own even more stringent than the federal law. No state may have laws setting standards which are lower than those of the federal act. This law prohibits mishandling, regulates the use of harmful preservatives, prohibits the sale of spoiled food, and in many other ways safeguards the health of the nation.

COOKING PROCESSES

Cooking is that part of the preparation of food for eating which involves the application of heat. The reasons for cooking food are: (1) To make it more palatable and so stimulate appetite. (2) To increase its digestibility by softening tough fibers and by bringing about slight chemical changes by heat. (3) To destroy harmful bacteria and parasites sometimes found in raw food.

Success in cookery depends upon the quality of the food material, upon accurate measurements, upon care and skill in combining ingredients, upon the method and time allowed for cooking, and upon a knowledge of food composition.

Selection of food Care should always be taken to choose foods which are fresh, free from adulteration, and which have been kept under sanitary conditions.

Measurements To be accurate, measurements must be level. The cup or spoon should be filled and leveled off with the edge of a knife. This is the only way to insure uniform results.

Blending ingredients There are several ways of accomplishing this purpose.

1. *Stirring.* This is simple mechanical mixing in which a mass of ingredients is made uniform.
2. *Beating or whipping.* This consists in so manipulating a soft mixture as to incorporate the air. A spoon or a special device is so applied that the bottom of the mixture is steadily lifted to the top.
3. *Folding in.* This term is applied to the method of introducing beaten white of egg slowly and gently into a soft mass, so as to render it light, the air being retained.
4. *Cutting.* This is used only in making pastry. Two knife blades are worked in opposite directions until the shortening is well incorporated in the flour.

The composition of the food material to be cooked should be known in order both to choose the best method for cooking it and to judge of the time and temperature that will give the best results. The digestibility of the food and its value to the body depend much upon the way it is cooked.

Effect of temperature upon food materials Albumin is toughened or hardened by a high temperature. It is most easily digested when

cooked below the boiling point of water. The effect of high heat upon albumin is utilized in the cooking of meats, when the surface is quickly seared in order that a coating of coagulated albumin may be formed, thus sealing in the meat juices.

In the preparation of meats for broths and soups, the meat is first allowed to stand in cold water to dissolve the albumin, and a high temperature is avoided throughout the cooking.

A high temperature decomposes fats and produces substances that are irritating to the delicate mucous membranes of the digestive tract. Hence fried foods are not advised in the diet of the very ill.

Starch is rendered easier of digestion by the action of heat, being partially converted into dextrin by dry heat as in the making of toast, and to a less extent by moist heat as in the cooking of cereals. Still more important is the softening and breaking of the starch grains by the action of high temperatures and moisture.

Cooking processes

1. *Boiling, stewing,* and *simmering* are methods of cooking food in water. This method is used in the cooking of almost all vegetables and some cereals. Gentle boiling is just as effective as rapid boiling and requires less fuel.

2. *Stewing* is much the same as boiling, except that less water is used, and the food is cooked longer. The vessel is covered so that the condensed water vapor will fall back into the pot. This method is used in cooking the tougher cuts of meat and dried fruits.

3. *Simmering* is cooking in water slightly below the boiling point, about 200° to 210° F. It is the method used in the cooking of soups, broths, and eggs.

4. *Steaming* is cooking by heat derived from the vapor of boiling water. The food may be placed in a steamer in direct contact with the steam, or in a double boiler where the steam surrounds the food container. In either case the temperature is slightly below that of boiling water. Cereals, fruits, and all kinds of vegetables may be cooked by steam.

5. *Baking* and *roasting* are methods of cooking in the oven by means of heated air. Baking applies to such foods as bread, cakes, pies, custards, soufflés, and escalloped dishes. Roasting originally meant cooking before an open fire, but the term is now applied principally to the cooking of meats in the oven.

6. *Broiling* or *grilling* is cooking by direct heat from a glowing fire or flame. This is chiefly used for tender cuts of meat, as chops and steaks.

7. *Panbroiling* is applied to the cooking of the same type of food in a hot frying pan or griddle, with or without added fat.

In cooking meats by any of these methods, the surface is first seared by the high temperature, and the cooking is completed at a lower temperature.

8. *Frying* and *sautéing* are methods of cooking in hot fat. For frying, the food is immersed in deep fat, as in the cooking of doughnuts and fritters. Sautéing is done in a small amount of fat in a frying pan, as for hashed browned potatoes.

9. *Fricasseeing* is a combination of sautéing and stewing.

10. *Braising* is a combination of baking and stewing. By both of these methods the juice is partially extracted, but is served with the meat as a gravy or sauce.

11. *Poaching* is a term applied to the cooking of eggs in shallow water. The egg is dropped into boiling water. This cools the water, and the cooking is completed at a temperature below 212° F.

Utensils For convenience in measuring, use a standard half-pint cup. These cups are marked into thirds and fourths and are made in both glass and metal. The metal is safer to use for measuring very hot materials, unless Pyrex glass is used.

Wooden spoons are better than metal ones for mixing and stirring. They are softer and pleasanter to use, they do not chip and are not acted upon by acids. They can be had in all sizes. They should not be used after they have begun to splinter.

When beating egg yolk or eggs that are not separated, a Dover egg beater or one of similar make is best to use. White of egg can be made lighter by the use of a wire egg whisk.

A double boiler should be used for cooking foods that are easily burned, such as cereals, milk, and milk sauces. A double boiler should also be used where a high temperature is to be avoided, as in custards.

When mixing batters, a crockery bowl is preferable to one of lighter weight. Galvanized iron utensils should never be used in cooking fruit or any acid material, as these react with each other and produce substances which act as an emetic.

Washing of dishes All dishes and utensils should be scraped and

piled, similar things together, before beginning the washing. Greasy dishes or utensils should be wiped with soft paper, rinsed with hot water, or put to soak in hot water to which a little washing soda has been added; the alkali combines with the grease and makes it easy to remove. Soda should not be used in the cleaning of aluminum utensils, as it discolors them.

Since albumin is soluble in cold water and is hardened by heat, all dishes which have contained milk or eggs should be washed or soaked in cold water before being put into hot dish water.

All dishes should be washed in hot soap suds and rinsed in clear, hot water in the following order: glass, silver, china, cutlery, cooking utensils. Dish water should be changed often and should never be allowed to become greasy.

Cloths and towels should be washed in hot soap suds and rinsed in clear water, and if possible hung in the sun to dry. The good accomplished by use of hot water in washing dishes may be quite undone by use of unsanitary dish towels. If china is rinsed freely with hot water and allowed to stand in a dish drainer, most drying can be accomplished without wiping with towels.

Disinfecting dishes In case of infectious diseases, all dishes and utensils should be placed in soapy water, brought to a boil, and boiled vigorously for 5 minutes. Rinse with boiling water.

Care of refrigerators The refrigerator and all cupboards where food is stored should be kept scrupulously clean. All shelves and compartments should be washed once a week with soap and water and should be inspected daily to see that no spilled food is allowed to remain.

The refrigerator should be so constructed as to insure circulation of air. In case of an icebox, the ice chamber and drain pipes need especial attention and should be frequently washed and flushed out with hot soda water, using about 1 tablespoon of soda to a gallon of water. The part of the drainage pipe that can be removed should be taken out and cleaned with a brush. The drain pipe from an icebox should not connect directly with the sewerage system.

Such precautions are not necessary with the modern automatic refrigerator. However, such a refrigerator should be defrosted at frequent intervals to insure the greatest benefit from the refrigerant.

Milk, butter, and eggs absorb odors and flavors very quickly and should be kept in covered dishes. Articles that have a very strong odor,

such as onions and fish, should not be put into a refrigerator with other foods, or else kept in covered dishes.

It is well to test the temperature of a refrigerator frequently with a thermometer. A good average temperature is 50° F., although it is possible to have it slightly lower.

Hot foods should not be put into a refrigerator, as they raise the temperature of the compartment and may cause undesirable changes in the food itself.

QUESTIONS FOR STUDY

FOOD SANITATION

1. What precautions are advised in the selection of food, its care before using and its preparation for the table? What is the importance of this care?
2. State five methods by which food may be preserved.
3. What precautions are advised in the use of canned goods?
4. What are the causes of food poisoning?
5. What is the Federal Food, Drug and Cosmetic Act of 1938?

COOKING PROCESSES

1. Give three reasons for cooking food.
2. Name four methods used in blending food materials.
3. What is the effect of high temperature upon albumin? Upon starch? Upon fat?
4. What is the difference between boiling and simmering? Between pan-broiling and frying?
5. When is the use of a double boiler advised?
6. Describe the method of washing dishes and care of dish towels.
7. How may dishes be disinfected?
8. Describe the care of the icebox. Of the automatic refrigerator.

27.
MEASURES AND WEIGHTS

Accurate measurement is necessary to insure success in cooking. Whether measured by the teaspoon, tablespoon, or cupful, all ingredients are measured level but not packed. To measure a cupful of dry material, put the ingredients in by spoonfuls, round slightly, and level with the back of a straight-backed knife. Do not shake the ingredients.

To measure a spoonful, fill the spoon heaping and level with the back of a straight-backed knife. Measuring spoons come in sets of 1/8 teaspoon, 1/4 teaspoon, 1/2 teaspoon, and 1 tablespoon. If necessary, however, the following method may be used: To measure a half-spoonful, fill as for a spoonful and divide in half lengthwise. To obtain a quarter-spoonful, divide in half again, allowing a little more for the tip.

All dry ingredients such as flour, meal, confectioner's or powdered sugar should be sifted before measuring. Mustard, cream of tartar, soda, and salt should be stirred before measuring to lighten.

Butter, lard, and other solid fats should be packed solidly into spoon or cup and leveled with a straight-backed knife. To measure a half-cupful, fill the cup half full of water and put in chunks of butter until the water reaches the top of the cup, then pour it off. Similarly, fill 3/4 full of water to measure 1/4 cup of butter, or 1/4 full of water to measure 3/4 cup of butter. When the recipe calls for *butter melted*, measure before melting; and when it calls for *melted butter*, measure after melting.

HOUSEHOLD MEASURES AND WEIGHTS

(Level measurements)

3 teaspoons (tsp.)	=	1 tablespoon
2 tablespoons (tbsp.)	=	1/8 cup
4 tablespoons	=	1/4 cup or 1 wineglassful
8 tablespoons	=	1/2 cup
16 tablespoons	=	1 cup or 2 gills
2 cups (c.)	=	1 pint
2 pints (pt.)	=	1 quart
4 quarts (qt.)	=	1 gallon (gal.)

APPROXIMATE MEASURE OF SOME COMMON FOODS

	1 OZ. OR 30 GRAMS IN TABLESPOONS	1 LB. OR 2.2 KILOGRAMS IN CUPS
Arrowroot	3	
Barley flour	4	
Butter	2	2 packed
Buttermilk	2	
Brandy	2	
Cocoa	5	
Coffee, powdered	4	
Cornmeal	4	3
Cornstarch	4	
Cream	2	
Cream of wheat	4	
Farina	4	2⅔
Flour, graham, unsifted	4	4¼
white, unsifted	4	3⅔
sifted	5	4
Grape juice	2	
Hominy	3	
Lemon juice [1]	2	
Lime juice, powdered	4	
Meat, chopped fine		2
Milk, malted	3½	
skimmed	2	
whole	2	
Molasses	2	
Olive oil	2	
Orange juice	2	
Rice flour	3	
Rice	3	2⅓
Rolled oats, Armour	8	7
Kellogg's	6	5¾
Quaker	5	4½
Sugar, brown	3	2¾
granulated	3	2¼
powdered	4	2½

THE METRIC SYSTEM

The unit of volume in the metric system is the cubic centimeter (c.c.) or the milliliter (ml.). The unit of weight is the gram, the standard for which is the weight of 1 milliliter of water at 0° centigrade. The metric system is a decimal system and thus is easier to use than other more complicated systems. It also has the advantage that the unit of weight bears a simple numerical relation to the unit of volume. Thus 1 ml. of water weighs 1 gram (gm.), and when the volume of liquids is known the weight may be readily approximated. This does not apply for dry materials; they must be weighed. The common higher unit of volume is the liter (L) = 1000 ml. and of weight the kilogram (kgm.) = 1000 gm. Smaller units of weight commonly used are the

[1] Juice of 1 lemon = approximately 3 tbsp.

milligram (mgm.) and the microgram (mcgm.). One gram equals 1000 mgm.; 1 mgm. = 1000 mcgm.

VOLUME

1 tsp.	=	5 ml. (or c.c.)
1 dessertspoonful	=	10 ml. (or c.c.)
1 tbsp.	=	15 ml. (or c.c.)
2 tbsp.	=	30 ml. approx. (28.35 ml. exactly)
1 cup	=	240 ml. approx. (236.6 ml. exactly)
1 pint	=	475 ml. approx. (473.2 ml. exactly)
1 quart	=	1000 ml. approx. (946.3 ml. exactly)
1.056 quarts	=	1 liter (L) or 1000 ml.

WEIGHT

1 ounce (oz.)	=	30 gm. (28.35 gm. exactly)
1 pound (lb.)	=	450 gm. approx. (453.6 exactly)
2.2 pounds	=	1 kilogram (kgm.) 1000 gm.

CONVERSION FACTORS

Ounces	x 30	(28.35 exactly)	=	grams
Pounds	x 450	(453.6 exactly)	=	grams
Grams	x .035	(.0352 exactly)	=	ounces
Kilograms	x 2.2	(2.204 exactly)	=	pounds

APOTHECARIES' MEASURES AND WEIGHTS

MEASURES

60 minims (M)	=	1 fluid drachm
8 fluid drachms (fʒ)	=	1 fluid ounce
16 fluid ounces (f℥)	=	1 pint
2 pints (pt.)	=	1 quart
4 quarts (qt.)	=	1 gallon

WEIGHTS

20 grains (gr.)	=	1 scruple
3 scruples (℈)	=	1 drachm
8 drachms (ʒ), 480 grains	=	1 ounce
12 ounces (℥)	=	1 pound (lb.)

APPROXIMATE EQUIVALENTS

HOUSEHOLD MEASURES

1 tsp.	about 1 fluid drachm
1 dessertspoonful	about 2 fluid drachms
1 tbsp.	about 4 fluid drachms or ½ fluid ounces
1 wine glassful (4 tsp.)	about 2 fluid ounces
1 teacupful	about 4 fluid ounces
1 cupful or tumblerful	about 8 fluid ounces

UNITS OF METRIC SYSTEM

Liquids	*Approximate Equivalents*	*Exact Equivalent*	
1 minim	0.06 ml.	0.061	ml.
1 fl. drachm	4 ml.	3.696	ml.
1 fl. ounce	30 ml.	29.574	ml.
4 fl. ounces or ¼ pint	118 ml. (⅛ liter)	118.295	ml.
8 fl. ounces or ½ pint	236 ml. (¼ liter)	236.590	ml.
16 fl. ounces or 1 pint	473 ml. (½ liter)	473.197	ml.
2 pints	1 liter (1000 ml.)	.946	liter
4 pints or ½ gallon	2 liters	1.892	liters
1 gallon	4 liters	3.785	liters
1 ml.	16 minims	16.23	min.
4 ml.	1 fl. drachm	1.082	fl. dr.
30 ml.	1 fl. ounce	1.014	fl. oz.
375 ml.	1 pint	15.892	fl. oz.
1000 ml.	2.1 pints	2.113	pints
4 liters	1 gallon	1.056	gal.

Solids	*Approximate Equivalent*		*Exact Equivalent*	
1 grain	0.065	gram	0.064798	gram
15 grains	1.0	gram	0.972	gram
1 ounce apothecary	31	grams	31.1	grams
1 pound apothecary	373	grams	373.24	grams
1 milligram	1/65	grain	0.015	grain
1 gram	15.5	grains	15.4324	grains
31 grams	1	ounce apothecary	479.94	grains
1 kilogram	2.7	pounds apothecary	2.679	pounds

CONVERSION TABLES [2]

A. OUNCES TO GRAMS

Ounces	Grams	Ounces	Grams
1/16	1.77	2	56.70
1/15	1.89	3	85.05
1/14	2.02	4	113.40
1/13	2.19	5	141.75
1/12	2.36	6	170.10
1/11	2.58	7	198.45
1/10	2.84	8	226.80
1/9	3.15	9	255.15
1/8	3.54	10	283.50
1/7	4.05	11	311.84
1/6	4.73	12	340.20
1/5	5.67	13	368.54
1/4	7.09	14	396.90
1/3	9.45	15	425.25
1/2	14.17	16	453.60
1	28.35		

B. POUNDS TO GRAMS

Pounds	Grams	Pounds	Grams
1	453.6	6	2722
2	907	7	3175
2.2	1000	8	3629
3	1361	9	4082
4	1814	10	4536
5	2267		

[2] M. S. Rose, *A Laboratory Handbook for Dietetics,* 4th ed., New York: The Macmillan Company, 1938.

CONVERSION TABLES (Cont'd)

C. GRAMS TO OUNCES [3]

Grams	Ounces	Grams	Ounces	Grams	Ounces
1	0.035	38	1.340	75	2.645
2	0.071	39	1.376	76	2.681
3	0.106	40	1.411	77	2.716
4	0.141	41	1.446	78	2.751
5	0.176	42	1.481	79	2.786
6	0.212	43	1.517	80	2.822
7	0.247	44	1.552	81	2.857
8	0.283	45	1.587	82	2.892
9	0.317	46	1.622	83	2.927
10	0.353	47	1.658	84	2.963
11	0.398	48	1.693	85	2.998
12	0.423	49	1.728	86	3.033
13	0.458	50	1.764	87	3.068
14	0.494	51	1.799	88	3.104
15	0.529	52	1.834	89	3.139
16	0.564	53	1.869	90	3.174
17	0.599	54	1.905	91	3.210
18	0.635	55	1.940	92	3.245
19	0.670	56	1.975	93	3.280
20	0.705	57	2.010	94	3.315
21	0.741	58	2.046	95	3.351
22	0.776	59	2.081	96	3.386
23	0.811	60	2.116	97	3.421
24	0.846	61	2.151	98	3.457
25	0.882	62	2.187	99	3.492
26	0.917	63	2.222	100	3.527
27	0.953	64	2.257	113	4
28	0.998	65	2.293	200	7
29	1.023	66	2.328	227	8
30	1.058	67	3.363	250	8.8
31	1.093	68	2.398	300	10.5
32	1.128	69	2.434	400	14
33	1.164	70	2.467	453.6	16
34	1.199	71	2.504	500	17.6
35	1.234	72	2.539	907	32
36	1.269	73	2.575	1000	35.2
37	1.305	74	2.610		

[3] *Ibid.*

THERMOMETRY

The thermometers used by the nurse in cookery, in regulating the heat of the room, or in taking the patient's temperature are chiefly of the Fahrenheit scale. Scientists in most countries employ the centigrade scale. While thermometers are made with both scales, it is a simple matter to translate the ordinary Fahrenheit to centigrade.

The freezing point on the latter is 0°, while on the former it is 32° above 0°.

The boiling point on the latter is 100°, while on the former it is 212°.

In order to change Fahrenheit to centigrade, it is necessary first to subtract 32° from 212° in order that the freezing points may correspond. This gives 180° F. as equal to 100° C., or 1° F. equal to 100/180 or 5/9 of a degree C. Any number of degrees F. is therefore equal to 5/9 of the same number C.

Example: Change 212° Fahrenheit to centigrade.

$$212^\circ - 32^\circ = 180^\circ.\ 180^\circ \times 5/9 = 100^\circ \text{ C.}$$

Conversely 1° C. is equal to 180/100, or 9/5 of a degree F. Any number of degrees C. is therefore equal to 9/5 of the same number F.

Example: Change 100° centigrade to Fahrenheit.

$$100^\circ \times 9/5 = 180^\circ.\ 180^\circ + 32^\circ = 212^\circ \text{ F.}$$

The Reaumur scale employs 0° as the freezing point and 80° as the boiling point.

COMPARISON OF THERMOMETERS

Fahr.	Cent.	Reau.	Fahr.	Cent.	Reau.
212	100	80	78	25.6	20.4
210	98.9	79.1	76	24.4	19.6
208	97.8	78.2	74	23.3	18.7
206	96.7	77.3	72	22.2	17.8
204	95.6	76.4	70	21.1	16.9
202	94.4	75.6	68	20	15
200	93.3	74.7	66	18.9	15.1
198	92.2	73.8	64	17.8	14.2
196	91.1	72.9	62	16.7	13.3
194	90	72	60	15.6	12.4
192	88.9	71.1	58	14.4	11.6

COMPARISON OF THERMOMETERS (Cont'd)

Fahr.	Cent.	Reau.	Fahr.	Cent.	Reau.
190	87.8	70.2	56	13.3	10.7
188	86.7	69.3	54	12.2	9.8
186	85.6	68.4	52	11.1	8.9
184	84.4	67.6	50	10	8
182	83.3	66.7	48	8.9	7.1
180	82.2	65.8	46	7.8	6.2
178	81.1	64.9	44	6.7	5.3
176	80	64	42	5.6	4.4
174	78.9	63.1	40	4.4	3.6
172	77.8	62.2	38	3.3	2.7
170	76.7	61.3	36	2.2	1.8
168	75.6	60.4	34	1.1	0.9
166	74.4	59.6	32	0.	0
164	73.3	58.7	30	—1.1	—0.9
162	72.2	57.8	28	—2.2	—1.8
160	71.1	59.6	26	—3.3	—2.7
158	70	56	24	—4.4	—3.6
156	68.9	55.1	22	—5.6	—4.4
154	67.8	54.2	20	—6.7	—5.3
152	66.7	53.3	18	—7.8	—6.2
150	65.6	52.4	16	—8.9	—7.1
148	64.4	51.6	14	—10	—8
146	63.3	50.7	12	—11.1	—8.9
144	62.2	49.8	10	—12.2	—9.8
142	61.1	48.9	8	—13.3	—10.7
140	60	48	6	—14.4	—11.6
138	58.9	47.1	4	—15.6	—12.4
136	57.8	46.2	2	—16.7	—13.3
134	56.7	45.3	0	—17.8	—14.2
132	55.6	44.4	—2	—18.9	—15.1
130	54.4	43.6	—4	—20	—16
128	53.3	42.7	—6	—21.1	—16.9
126	52.2	41.8	—8	—22.2	—17.8
124	51.1	40.9	—10	—23.3	—18.7
122	50	40	—12	—24.4	—19.6
120	48.9	39.1	—14	—25.6	—20.4
118	47.8	38.2	—16	—26.7	—21.3
116	46.7	37.3	—18	—27.8	—22.2
114	45.6	36.4	—20	—28.9	—23.1
112	44.4	35.6	—22	—30	—24
110	43.3	34.7	—24	—31.1	—24.9

COMPARISON OF THERMOMETERS (Cont'd)

Fahr.	Cent.	Reau.	Fahr.	Cent.	Reau.
108	42.2	33.8	—26	—32.2	—25.8
106	41.1	32.9	—28	—33.3	—26.7
104	40	32	—30	—34.4	—27.6
102	38.9	31.1	—32	—35.6	—28.4
100	37.8	30.2	—34	—36.7	—29.3
98	36.7	29.3	—36	—37.8	—30.2
96	35.6	28.4	—38	—38.9	—31.1
94	34.4	27.6	—40	—40	—32
92	33.3	26.7	—42	—41.1	—32.9
90	32.2	25.8	—44	—42.2	—33.8
88	31.1	24.9	—46	—43.3	—34.7
86	30	24	—48	—44.4	—35.6
84	28.9	23.1	—50	—45.6	—36.4
82	27.8	22.2	—52	—46.7	—37.3
80	26.7	21.3	—54	—47.8	—38.2
			—56	—48.9	—39.1

QUESTIONS FOR STUDY

1. What difference does it make whether flour, meal, etc., are sifted before measuring?
2. Describe a standard measuring cup.
3. How would you measure a cupful of dry material?
4. How would you measure a spoonful of dry material? A half-spoonful? A quarter-spoonful?
5. Give the method for measuring solid fats.
6. What is the difference between one tablespoon of butter melted and one tablespoon of melted butter? Between one cupful of flour sifted and one cupful of sifted flour?
7. The following measures and weights are so frequently needed by the nurse that they should be memorized, but it is equally important that she familiarize herself with the entire contents of the tables, in order that she may know where to turn quickly for useful information.
   (a) How many tablespoons are there in one cup?
   (b) How many teaspoons are there in one tablespoon?
   (c) How many cups in one pint?
   (d) How many pints in one quart?
   (e) How many tablespoons of butter in one ounce?
   (f) How many tablespoons of flour in one ounce?

(g) How many tablespoons of sugar in one ounce?
(h) How many cups of butter in one pound?
(i) How many cups of granulated sugar in one pound?
(j) How many cups of sifted flour in one pound?
(k) How many grams in one ounce?
(l) How many ounces in one pound?
(m) How many grams in one pound?
(n) How many grams in one kilogram?
(o) How many pounds in one kilogram?

8. Change 160 degrees Fahrenheit to centigrade.
   Change 70 degrees centigrade to Fahrenheit.

28.
BEVERAGES

The most important beverages are water and milk, the latter of which is discussed in Chapter 37. Water, the chief constituent of all beverages, is as important to life as food. Nearly 70 per cent of the human body is composed of water. Beverages serve primarily to relieve thirst; and they are also taken for their temperature (hot or cold), their flavor (to arouse or appease appetite), or their stimulating qualities. Those made with nutritive materials such as milk, eggs, cocoa, and chocolate form a valuable means of giving food in liquid form.

ACID BEVERAGES

Beverages made from fruit juices are cooling and refreshing, and thus are especially grateful to fever patients.

Nutritive value Fruit-juice beverages are valuable for the organic acids, mineral matter, sugar, and vitamins which they contain. Some of them—lemonade and orangeade, for instance—have an added value in their diuretic and diaphoretic action. The organic acids are useful in cases of constipation because they stimulate peristaltic action. These acids vary with the kind of fruit—apples contain *malic* acid, lemons *citric* acid, grapes *tartaric* acid, etc. In the body these acids are changed to carbonates, which preserve the alkilinity of the blood. Ripe pineapple juice contains a ferment capable of digesting proteins.

Preparation Wash lemons and oranges before squeezing. In using the juice, remove the seeds because they give a bitter taste. When the rind of lemon or orange is medicinally undesirable, it should not, of course, be used, even though the recipe may call for it.

Serving Serve acid beverages in glasses or sherbet cups three quarters full, on a small plate or tray covered with a doily. Add a few wafer crackers or a single flower to the tray.

Sweetening When the drinks are prepared with cold water, "suga

yrup" is preferable to sugar for sweetening because sugar dissolves owly in cold water.

Some fruits are less acid than others, hence need less sugar. Bear his in mind while preparing the following recipes. Otherwise too nuch sugar may be added.

SUGAR SYRUP

(For sweetening acid beverages)

½ cup sugar
½ cup boiling water

Mix the sugar and water and stir until the sugar is dissolved. Cook lowly, without stirring, for 10 minutes. Cool slightly and bottle. Makes bout 10 tablespoonfuls.

Calories, 420: carbohydrate, 105 grams.[1]

LEMONADE I

1 tbsp. sugar *or* sugar syrup to taste
1 cup cold water
3 tbsp. lemon juice *or* juice of 1 lemon

Dissolve the sugar in the lemon juice; add the cold water and a little ce if desired.

Calories, 60: carbohydrate, 15 grams.

LEMONADE II

1 lemon
¾ cup boiling water
½ thin slice lemon
2 tbsp. sugar

Wash and wipe the lemon. Cut a very thin slice from the middle to be used as garnish. Squeeze the juice into a bowl, keeping back the seeds. Add he sugar and boiling water, cover, and put on ice to cool. When cold, train and pour into a glass or sherbet cup. Garnish the glass with the lice of lemon, or a slice of orange, cut into two pieces. Or use a few erries for garnish.

Calories, 121: carbohydrate, 30 grams.

FRUIT LEMONADE

Add fresh fruit of all kinds to strong lemonade, using boiling water for he beverage. The amount of sugar will depend upon the fruits used. Cool and chill on ice.

[1] Calories in all recipes are figured from the listed ingredients only.

LACTOSE LEMONADE (Coleman)

4 oz. milk sugar (about 12 tbsp.)
7 oz. cold water (about 14 tbsp.)
3 tbsp. lemon juice *or* lemon juice to taste

Boil the sugar and water for 2 minutes. Add the lemon juice, strain, and cool. If not sweet enough, add 1 or 2 tbsp. cane sugar.

Calories, 465: carbohydrate, 116 grams.

IRISH MOSS LEMONADE

¼ cup Irish Moss
2 cups cold water
4 tbsp. lemon juice
Sugar to taste

Pick over and wash the moss and soak for 15 minutes. Drain and add the cold water. Cook in the top of a double boiler about 20 minutes or until syrupy. If it becomes too thick, add hot water. Strain and add lemon juice and sugar. Reheat and serve hot.

Excellent for sore throat and cold on the lungs, or any inflammation of the mucous membrane.

Calories: from sugar only.

ORANGEADE I

1 sour orange
½ cup boiling water
2 tbsp. sugar
½ slice orange

Prepare as for Lemonade II. If the orange is not very acid, add a little lemon juice or use less sugar.

Calories, 160: carbohydrate, 40 grams.

ORANGEADE II

Put 2 tablespoons of crushed ice in a dainty glass and pour the juice of one orange over it. Sweeten if desired.

Calories, 40.

FRUITADE

¼ cup grated pineapple
Juice ½ lemon
Juice ½ orange
1 cup boiling water
Sugar

Add the boiling water and 1 tablespoon sugar to the fruit. Allow to stand until cool. Add more water or sugar if necessary. Strain and serve cold.

Calories, without sugar, 120; protein, 1 gram; carbohydrate, 29 grams.

LEMON WHEY

1 cup hot milk
2 tsp. sugar
2 tbsp. lemon juice

Heat the milk in a small saucepan over hot water, or in a double boiler. Add the lemon juice. Cook without stirring until the whey separates. Strain through double cheesecloth and add the sugar. Serve hot or cold. Garnish with small pieces or a slice of lemon.

Calories, 100.

WINE WHEY

1 cup sweet milk
¼ cup sherry wine

Heat the milk to the boiling point, add the wine and cook without stirring until the milk separates. Strain through a double cheesecloth and serve hot or cold.

Calories, 75.[2]

CREAM OF TARTAR DRINK

1 or 1½ tsp. cream of tartar
1 pint boiling water
Lemon
sugar

Dissolve the cream of tartar in the boiling water and flavor with lemon and sugar. When cold strain. Take as a refrigerant drink and diuretic.

IMPERIAL DRINK

Potassium bitartrate	(6.0)	ʒ iss
Sugar	(16.0)	℥ ss
Lemon peel, cut or grated	(16.0)	℥ ss
Boiling water	(1000.0)	O ij

MALTED MILK AND CURRANT JELLY

1 tbsp. malted milk powder
¼ cup boiling water
1 tbsp. currant jelly
¾ cup cold water
Cracked ice

Mix the malted milk powder with a little of the boiling water to make a smooth paste. Add the jelly and the rest of the water and stir until the jelly is dissolved. Add the cold water and ice, strain, and serve in glass or sherbet cup, partly filled.

Calories, 94: protein, 1 gram; fat, 1 gram; carbohydrate, 20 grams.

[2] Liquor is not included in the caloric value of any recipe, since it has no food value and produces heat only.

MALTED MILK WITH WINE

1 tbsp. malted milk powder
1 cup hot water
1 tsp. port or sherry wine
1 tsp. sugar

Mix the malted milk powder with enough of the hot water to make a smooth paste, then add gradually the rest of the hot water, the wine, and sugar if desired.

Calories, 58: protein, 1 gram; fat, 1 gram; carbohydrate, 11 grams.

JELLY AND ICE

Chip half a cup of ice into bits as large as a pea. Mix with it about the same quantity of lemon, currant, blackberry or barberry jelly. Very refreshing in fevers.

GRAPE WATER

4 tbsp. grape jelly
½ cup boiling water
½ cup cold water
Lemon juice and sugar

Dissolve the jelly in the boiling water, then add the cold water. Season to taste and serve ice cold.

Calories, without sugar, 208: carbohydrate, 52 grams.

CURRANT WATER

¼ cup currant juice *or*
4 tbsp. currant jelly
½ cup boiling water
½ cup cold water
Lemon juice and sugar

Dissolve the jelly in the boiling water, putting over heat a few moments if it does not dissolve quickly. When dissolved, add the cold water, sweeten to taste, and add a little lemon juice if desired. Serve cold.

APPLE WATER

1 sour apple
1 cup boiling water
Lemon juice
Sugar

Wipe a rosy-cheeked sour apple and, without paring, cut it into small pieces. Add the boiling water and 1 tablespoon sugar. Cover and let stand till cold, then strain and add lemon juice and sugar to taste. Serve cold.

Dried apple may be substituted, or two baked apples.

RHUBARB WATER

1 stalk rhubarb
1 cup boiling water
Lemon juice
Sugar

Wash and wipe the rhubarb and cut into thin slices, leaving the skin on. Add the boiling water and 1 tablespoon sugar. Cover and let stand till cold. Strain, add lemon juice and sugar to taste, and serve cold.

TAMARIND MALTED MILK

2 tbsp. malted milk powder
1 tbsp. preserved tamarinds
¼ cup hot water
½ cup cold water
Cracked ice

Make a smooth paste of the malted milk powder and hot water, add tamarinds and the cold water. Strain and chill, or add pure cracked ice.

Calories, 170: protein, 3 grams; fat, 1 gram; carbohydrate, 34 grams.

GRAPE JUICE

Partially fill a small glass with crushed ice, add grape juice, and serve.

100 grams grape juice (½ cup, scant)—Calories, 76; carbohydrate, 19 grams.

Many prefer grape juice diluted. Any good plain or charged water is acceptable. Use at least half grape juice and serve cold. Grape juice with an equal quantity of water may be served hot (do not boil) with sugar and lemon juice to taste.

GRAPE LEMONADE

To 1 cup of rather sweet lemonade, add ¼ cup grape juice.

GRAPE PUNCH

Mix the juice of 3 lemons and 1 orange, 1 pint of grape juice, 1 quart of water, and 1 cup of sugar. Serve cold.

Calories, 1200: protein, 2 grams; carbohydrate, 298 grams.

TEA PUNCH

Few beverages find readier favor during the hot weather than tea punch. To make it, pour boiling lemonade, sweetened to taste, over the tea leaves and allow the liquid to stand until cold. Then strain and serve in tall glasses with shaved ice and slices of lemon.

FRUIT PUNCH

(3 quarts)

2 large tsp. tea
2 quarts boiling water
1 pound lump sugar
8 lemons
3 oranges
1 pineapple
5 bananas
1 pint strawberries

Steep the tea in the boiling water for 5 minutes. Strain and add the sugar, stirring until thoroughly dissolved. Grate the rind of the lemons and extract all the juice. Cut the oranges into slices, shred the pineapple, slice the bananas very thin, and hull the strawberries. When the tea is cold, add all the fruit and let stand in the refrigerator for several hours. Place a cube of ice in the punch bowl, pour the mixture around it, and when well chilled serve in punch glasses. If desired, 1 cup of Maraschino cherries may be added.

To get the best results from the pineapple, pare and remove the eyes, tear apart with a silver knife and fork, reject the core, sprinkle with sugar, and let stand on ice for 12 hours.

While fresh fruits are always preferable, canned berries and pineapple may be substituted.

Calories, 2825: protein, 12 grams; fat, 6 grams; carbohydrate, 682 grams.

TUTTI FRUTTI PUNCH

(3 quarts)

2 quarts water
1 lb. sugar
2 lemons
4 oranges
2 dozen Malaga grapes
2 tangerine oranges
4 slices pineapple
1 banana
1 pint Maraschino cherries

Boil the water and sugar together for 5 minutes. Add the grated rind of 2 lemons and 4 oranges and continue boiling for 10 minutes longer. Strain the syrup through cheesecloth and add 1 quart of cold water. Extract the juice from the lemons and oranges, strain, and mix with the Malaga grapes cut in half and seeded, the tangerine oranges sliced, the pineapple shredded, the banana cut in slices, and the Maraschino cherries with their liquor. Add the fruit to the syrup, chill, and serve same as Fruit Punch.

Calories,[3] 2360: protein, 6 grams; fat, 1 gram; carbohydrate, 582 grams.

[3] Calculated without cherries.

ALBUMINOUS BEVERAGES

Albuminous or albuminized beverages are combinations of egg with water, milk, fruit juices and other fluids.

Nutritive value The yolk of egg contains about 30 per cent fat and has a much higher fuel value than the white. In cases where the patient's ability to digest fat is disturbed, egg yolk should be given with caution. The combination of egg, milk, and sugar with alcohol which constitutes eggnog may produce nausea and vomiting in a delicate stomach, especially in fever. Eggnog is very nutritious and is extensively prescribed in certain nonfebrile diseases, especially for forced feeding in phthisis and melancholia.

Preparation Albuminous drinks are most easily prepared cold. When a hot liquid is used, it must be poured very slowly into the well-beaten egg, stirring constantly, so that the albumin does not coagulate.

PLAIN ALBUMIN I

Slightly whip the white of 1 egg and allow it to stand in a cold place until the liquid separates from the foam. Remove the foam and serve the liquid albumin. Salt the mixture if desired.

Calories, 12: protein, 3 grams.

PLAIN ALBUMIN II

Mix the unbeaten white of 1 egg with an equal quantity of cold water, a large pinch of salt, and 10 drops or more of whisky. Serve by the teaspoonful or tablespoonful alternately with a heart stimulant when other food cannot be taken. A patient can live on this mixture for several days without other food.

Calories, 13: protein, 3 grams.

ALBUMIN WATER FOR INFANTS I

White of 1 fresh egg	1 tsp. brandy
½ pint of cold water	Pinch of salt

Shake the ingredients thoroughly. Feed either with a spoon or from a bottle. Albumin water is useful in cases of vomiting and can sometimes be retained by a very irritable stomach.

Calories, 13: protein, 3 grams.

ALBUMIN WATER FOR INFANTS II

Dissolve the white of 1 fresh egg in 8 oz. or 1 pint of water which has been boiled and cooled. Albumin water is utilized chiefly in cases of acute stomach and intestinal disorders in which some easily assimilated food is needed.

Calories, 13: protein, 3 grams.

ALBUMINIZED WATER

White of 1 fresh egg
½ cup cold water, boiled and chilled
1 tsp. sugar
1 tsp. lemon juice

Place all the ingredients in a shaker or glass fruit jar with airtight cover and rubber ring. Shake until thoroughly blended, strain, and serve cold in a small glass. A few grains of salt may be added.

Calories, 33: protein, 3 grams; carbohydrate, 5 grams.

ALBUMINIZED CLAM BROTH

White of 1 fresh egg
¾ cup cold water
Clam broth to taste

Blend in a shaker as for Albuminized Water above. Milk may be substituted for the water. This drink will often be retained when other nourishment is rejected.

Calories, 13: protein, 3 grams.

ALBUMINIZED GRAPE JUICE

White of 1 fresh egg
2 tbsp. grape juice
Sugar to taste

Whip the egg white very stiff. While still whipping, slowly add the grape juice and sugar. Serve cold.

Calories without sugar, 24: protein, 3 grams; carbohydrate, 3 grams.

ALBUMINIZED MILK

White of 1 fresh egg
½ cup milk
⅛ cup lime water *or* speck salt

Blend in a shaker as for Albuminized Water above. The lime water may be omitted and the beverage seasoned with salt instead.

Calories, 96: protein, 7 grams; fat, 5 grams; carbohydrate, 6 grams.

ALBUMINIZED ORANGE JUICE

White of 1 fresh egg
¼ cup cold water
Juice of 1 orange
1 tbsp. sugar
Lemon juice if desired

Blend in a shaker as for Albuminized Water above.

Calories, 113: protein, 3 grams; carbohydrate, 25 grams.

ALBUMINIZED SHERRY

White of 1 fresh egg
¾ tbsp. sherry
Sugar to taste

Whip the egg white very stiff. Continue to whip while adding the wine nd sugar very slowly. Serve cold.

Calories without sherry and sugar, 13: protein, 3 grams.

EGG BROTH

Yolk of 1 egg
1 tbsp. sugar
Speck of salt
1 cup hot milk
1 tbsp. brandy

Beat the egg, then add the sugar and salt. Pour the hot milk carefully on he egg mixture, a little at a time. Stir in the brandy.

Wine may be used instead of brandy, or stimulants omitted entirely.)ried and rolled bread crumbs may be added if desired. The whole egg nay be used instead of the yolk. Hot water, broth, or coffee may be substiuted for the milk. Nutmeg may be used for flavoring if the brandy is mitted.

Calories, 283: protein, 11 grams; fat, 14 grams; carbohydrate, 27 grams.

EGGNOG I

1 egg
¾ tbsp. sugar
Speck of salt
¾ cup milk
1½ tbsp. wine *or* 1 tbsp. brandy (or less)

Have the milk and eggs chilled before mixing. Beat the egg well, add the ıgar and salt, then the milk and liquor. Blend thoroughly in a shaker. lavor with a grating of nutmeg if desired.

Calories, 249: protein, 13 grams; fat, 13 grams; carbohydrate, 20 grams.

EGGNOG II

1 egg
2 tsp. sugar
Speck of salt
¾ cup milk
Vanilla or nutmeg flavoring
1 tbsp. brandy (or less)

Separate the yolk and white of egg. Beat the yolk until creamy, adding the sugar and salt as you beat. Add the milk and flavoring, and the brandy if desired. Whip the white until foamy but not stiff, and fold in lightly. Serve immediately.

Calories, 244: protein, 13 grams; fat, 13 grams; carbohydrate, 19 grams.

BEEF EGGNOG

1 egg
Speck of salt
1 tbsp. sugar
½ cup hot beef broth
1 tbsp. brandy

Beat the egg slightly, add the salt and sugar, and carefully stir in the hot broth. Add the brandy and strain. Sugar and brandy may be omitted if preferred.

Calories, 156: protein, 8 grams; fat, 7 grams; carbohydrate, 15 grams.

COFFEE EGGNOG

1 egg
1½ tsp. sugar
½ cup (scant) milk or cream
½ cup (scant) strong coffee

Separate the yolk and white of egg. Beat the yolk until creamy, adding the sugar as you beat. Add the milk and coffee to the egg mixture. Whip the white until foamy but not stiff, and fold in lightly. Serve immediately. Ingredients should be chilled before mixing.

Calories,[4] 178: protein, 10 grams; fat, 10 grams; carbohydrate, 13 grams.

RENNET EGGNOG

1 egg
1 tbsp. sugar
2 tsp. rum, brandy, or wine
1 cup milk, lukewarm
½ rennet tablet
Grated nutmeg

Separate the yolk and white of egg. Beat each very lightly and blend the two. Dissolve the sugar in the liquor and add to the egg mixture. Stir in the lukewarm milk, and quickly add the rennet tablet which has been dissolved in a little cold water. Pour into warmed small glasses and sprink

[4] Calculated with milk.

grated nutmeg over the top. Stand in a warm room until firm, then put on ice to cool. This can be retained by the most delicate stomach.

Calories, 305: protein, 15 grams; fat, 15 grams; carbohdyrate, 27 grams.

EGG AND BRANDY

3 eggs
4 tbsp. cold water
4 tbsp. brandy
Sugar to taste
Nutmeg

Beat the eggs, add the cold water and brandy, and sweeten to taste. Add a few grains of nutmeg if desired. Feed a tablespoonful at a time.

Calories without sugar, 237: protein, 19 grams; fat, 17 grams; carbohydrate, 1 gram.

EGG AND RUM

(Famous in the treatment of phthisis)

Yolk of 1 egg
1 tbsp. sugar
Speck of salt
Few grains nutmeg
1 cup fresh milk
1 tbsp. rum

Beat the egg yolk until creamy, adding the sugar, salt, and nutmeg as you beat. Stir in the milk and rum.

Taken at 6 A.M., this often prevents the exhausting sweats which accompany the morning doze of tuberculous patients. It may also be given to a patient before dressing to prevent exhaustion.

Calories, 283: protein, 11 grams; fat, 15 grams; carbohydrate, 27 grams.

EGG AND WINE

1 egg
½ cup cold water
1 wineglass sherry
Sugar to taste
Nutmeg

Beat the egg. Heat the water and wine together, but do not boil. Pour over the egg, stirring constantly. Flavor with sugar and nutmeg.

Calories without sugar, 79: protein, 6 grams; fat, 6 grams.

EGG LEMONADE

1 egg
2 tbsp. sugar
2 tbsp. lemon juice
⅔ cup cold water

Beat the egg thoroughly. Add the sugar and lemon juice and pour in the water gradually, stirring until smooth and well mixed. Strain and serve. Two tablespoons of sherry or port may be added if desired.

Calories, 199: protein, 6 grams; fat, 6 grams; carbohydrate, 30 grams.

MALTED MILK AND EGG

- 1 tbsp. malted milk powder
- 1 tbsp. crushed fruit
- 1 egg
- 20 drops acid phosphate
- 1 tbsp. crushed ice
- ¾ cup ice water
- Nutmeg

Mix the malted milk powder, crushed fruit, and egg and beat 5 minutes. Add the phosphate and crushed ice, blending thoroughly. Strain and add ice water or cold carbonated water and a grating of nutmeg.

Calories without fruit, 117: protein, 6 grams; fat, 7 grams; carbohydrate, 7 grams.

STOKES'S MIXTURE

"Two egg yolks, 50 c.c. of brandy, 120 c.c. of aqua aurantii florum, sugar or syrup enough to sweeten. Has considerable nutritive as well as stimulative value and is eligible for use when such a combination is indicated."

GRAPE YOLK

- 1 egg
- 1 tbsp. sugar
- Speck of salt
- 2 tbsp. grape juice

Have all ingredients chilled before blending. Separate the egg. Beat the yolk, add the sugar, and set aside while the white is thoroughly whipped. Add the grape juice to the yolk and pour this over the whipped white, blending carefully. Serve cold.

Calories, 161: protein, 6 grams; fat, 6 grams; carbohydrate, 20 grams.

MULLED WINE

- ½ cup boiling water
- 1 1-oz. stick cinnamon
- Few grains nutmeg
- ½ cup sherry, port, or claret
- 1 egg
- 2 tbsp. sugar

Put the boiling water and the spices into the top of a double boiler. Cover and cook over hot water for 10 minutes. Add the wine to the spiced water and bring to the boiling point. Beat the egg to a stiff froth, add the sugar, and pour on the mulled wine. Beat well and serve at once.

Calories, 199: protein, 6 grams; fat, 6 grams; carbohydrate, 30 grams.

CHOCOLATE AND COCOA

Source Chocolate and cocoa are made from the seeds of the cacao tree (*Theobroma cacao*). The seeds, or beans, grow inside a pulpy fruit 7 to 12 inches long, 3 to 5 inches in diameter. Its shape is a cross between a melon and a cucumber. The fruit is gathered and heaped up and allowed to ferment for a few days. The pulp becomes loosened and the seeds lose some of their bitterness, upon which the flavor of the bean largely depends. Then the seeds are dried in the sun, cleaned, sorted, and carefully roasted. The thin outer husks are removed and sold as *cocoa shells*. Broken roasted beans constitute *cocoa nibs*.

Chocolate is made by grinding the nibs very finely between hot rollers. Because of the large proportion of fat (50 per cent) in the cocoa bean, the ground mass assumes the form of a paste. This paste is molded and cooled, with or without the addition of sugar and flavoring. In cookery chocolate means the unsweetened variety unless otherwise specified.

Cocoa is the powdered form of chocolate, with part of the fat content removed. Sugar or starch or both are sometimes added.

Nutritive value Chocolate and cocoa contain *theobromine,* a stimulant milder than the theine of tea or the caffein of coffee. Tannic acid is also present, but in smaller amounts than in tea or coffee. Theobromine is an alkaloid closely allied to caffein, but less likely to induce nervous symptoms. Many people do, however, feel the stimulating effect of theobromine.

Unlike tea and coffee, chocolate and cocoa have a high food value:

	WATER	PROTEIN	FAT	CARBO-HYDRATE	MINERALS	CALORIES PER LB.
Chocolate, bitter	2.3%	5.5%	52.9%	18.0%	3.3%	2585
Cocoa, dry	4.3%	9.0%	18.8%	31.0%	7.2%	1495

Chocolate is likely to cause indigestion when used to excess or when taken in addition to an already heavy meal. Cocoa is free from this objection because it is less rich in fat.

Cocoa added to milk makes a useful beverage for convalescents if there are no digestive disturbances because the addition of cocoa often makes milk palatable when otherwise it would be refused. This beverage may be given to children in moderation, but should contain sufficient cocoa to give it flavor.

Principles of cookery Chocolate and cocoa both contain considerable starch, and beverages containing them are made more digestible if first boiled. This cooking of the starch thickens the beverage and makes it smoother. The flavor of chocolate and cocoa comes from a volatile oil; hence they should be cooked only long enough to alter the starch. If cooking is continued too long, the flavor of the beverages is lost.

Chocolate and cocoa should be *milled,* which means simply "well beaten." The term mill comes from the Latin-American countries, where chocolate is made very rich and thick, and a special mill is used for the beating. A wheel egg beater is enough when the beverage is made as thin as it usually is in this country. After the milk has been added, beat vigorously until frothy (2 or 3 minutes). If the mixture is allowed to scald after the milk is added, a skin will form. This skin is undesirable, but if it forms it should be beaten in rather than removed because it has nutritive value.

PLAIN CHOCOLATE

(Individual rule)

½ square chocolate (½ oz.)	1 cup scalded milk
1 tbsp. sugar	Few grains salt

Melt the chocolate in a saucepan. Add the sugar and the scalded milk. Boil 5 or 10 minutes, or until smooth. Beat until frothy and serve at once.

If a thicker drink is desired, mix ⅛ tablespoon cornstarch with the sugar. For a richer drink, serve with whipped cream or pour over the beaten yolk of an egg.

Flavor with vanilla if desired.

Calories, 312: protein, 11 grams; fat, 16 grams; carbohydrate, 31 grams.

VIENNA CHOCOLATE

(Individual rule)

1 oz. vanilla chocolate	1 tbsp. boiling water
¼ tbsp. sugar	1 cup scalded milk

Melt the chocolate in a small saucepan with the sugar and boiling water stirring until smooth and glossy. Stir this mixture into the scalded milk and beat until frothy. Put 1 tablespoon of whipped cream in the bottom of the cup and fill with chocolate.

Unsweetened chocolate may be used instead of vanilla chocolate. In that case, use ¼ teaspoon of vanilla and a tablespoon of sugar.

Calories, 415: protein, 12 grams; fat, 24 grams; carbohydrate, 38 grams

BREAKFAST COCOA

(Individual rule)

¾ cup scalded milk	1 tsp. sugar
2 tsp. cocoa	¼ cup boiling water

Scald the milk in a double boiler. Put the cocoa and sugar in a saucepan and slowly pour on the boiling water, stirring constantly. Boil for 5 minutes. Add to the scalded milk and beat until frothy with an egg beater. Serve in heated cups.

Cocoa may be served hot or cold, with or without whipped cream. It may be served hot, poured over the beaten white or yolk of an egg. If ordered by the physician, ⅓ teaspoon of brandy may be added.

Calories, 149: protein, 6 grams; fat, 7 grams; carbohydrate, 15 grams.

MALTED MILK COCOA

(Individual rule)

1 tbsp. malted milk powder	¾ cup boiling water
1 tsp. cocoa	Sugar to taste

Mix the malted milk powder, the cocoa, and the boiling water, stirring well. Add sugar if desired and serve hot.

Calories without sugar, 40: protein, 1 gram; fat, 1 gram; carbohydrate, 7 grams.

COCOA WITH LACTOSE AND MILK (Coleman)

2 tsp. cocoa	4 oz. milk
2 oz. milk sugar	2 oz. cream (20%)

Mix the sugar and cocoa. Add to the milk and cook until dissolved. Serve with cream.

Calories, 462: protein, 6 grams; fat, 18 grams; carbohydrate, 69 grams.

COCOA WITH LACTOSE AND WATER (Coleman)

2 tsp. cocoa	½ cup water
2 oz. milk sugar	3 oz. cream (20%)

Mix the cocoa and sugar, add the water, and boil. Then add the cream. Or use less cream in the cocoa and serve with whipped cream.

Calories, 442: protein, 3 grams; fat, 19 grams; carbohydrate, 65 grams.

ICED COCOA OR CHOCOLATE

Fill a tall glass one-third full of cracked ice. Pour over it the freshly made beverage, and top with 1 tablespoon whipped cream.

COFFEE

The coffee tree, *Coffea arabica,* originally found in Arabia, grows in many semitropical regions. The coffee berry or seed is about the size of a ripe cherry and has two seeds arranged face to face. After the berries are gathered, washed, and dried they are processed to remove the outer coverings. They may then be stored as green beans. The final step is the roasting process, which releases the volatile oil, caffeol, responsible for the aroma of coffee. Roasted coffee gradually loses its aroma and especially so after it is ground. For this reason many brands of coffee are marketed in sealed containers from which the air has been exhausted. A freshly roasted and freshly ground product is a prerequisite for making good coffee.

Nutritive value Coffee has no nutritive value except for a small quantity of sugar and protein which may be dissolved from it. It is primarily a stimulant. The stimulating principle is caffein, which has the same constitution as the theine of tea. Coffee also contains a small amount of tannic acid, percolated coffee having more tannic acid than drip coffee.

Effects Coffee has only a slight retarding influence on salivary digestion, but it has a somewhat detrimental effect on gastric digestion.

As a stimulant, coffee affects the central nervous system, the heart action being considerably increased in rate and in strength. This results indirectly in an increased activity of the kidneys. Respiration is deepened, and the cerebral centers are excited. For this reason coffee is often useful in cases of opium and alcoholic poisoning. In some persons these effects are very mild; in others they are severe, producing nervousness and insomnia. In such case coffee should be withheld from the patient.

Many nurses use coffee when on night duty because it takes away the feeling of fatigue. Taken in large quantities—5 cups or more—it may cause unpleasant sensations, but it is not followed by depression as is the case with other stimulants. Children should never be allowed coffee, nor those persons who have special idiosyncrasies toward it.

Frequently after operation freshly made black coffee or tea without milk or sugar will be retained, and in some cases will check vomiting. Give the patient ½ teaspoonful at frequent intervals.

Principles of Cookery In making coffee the objective is to extract the volatile oil and retain it in the beverage. The methods in most gen-

eral use are (1) percolating, an arrangement whereby the hot water is kept passing over the coffee, (2) steeping or boiling, where the coffee is simply placed in a container of boiling water and (3) filtering, which employs a device for holding the coffee against a fine filter, either paper or cloth, while near boiling water is passed through the finely ground coffee once. Percolating permits almost complete extraction of the flavor but at the same time allows a possible loss of flavor through overheating. Boiled coffee is generally less attractive in flavor and appearance than coffee prepared by the other two methods. Filtered coffee has a full rich aroma, is free of sediment, and has a good color.

DRIP OR FILTERED COFFEE

This is the method most strongly recommended to get the full flavor of the coffee. The coffee should be ground as finely as possible. Use 2 level tablespoonfuls of coffee for each standard measuring cup of water.

a. For pots other than glass:

Scald the pot. Insert filter provided in the basket and add coffee. Pack it down by shaking the container and pour the boiling water over it according to the directions which come with the pot.

b. For glass utensils (vacuum method):

Fill the lower part of the coffee machine with water and boil. Put the coffee into the upper section, adjust the upper section into the lower section when the water has reached the boiling point. Continue boiling until all but a little water has risen into the upper section. Stir for 30 seconds, first one way and then the other, and remove the pot from the heat.

When the water has dripped through, the coffee must be kept hot but never boiled. This may be accomplished by placing the pot in a shallow pan containing boiling water or an asbestos mat over a low flame will serve the same purpose.

PERCOLATED COFFEE

Select a percolator which allows enough room in the top for 2 level tablespoons of coffee for each standard measuring cupful of water. Put the right amount of water in the pot, put the coffee in the container on top, and place on the fire. When the water begins to percolate, turn down the flame until the water just bubbles through. Percolate from 5 to 10 minutes. Each pot is a little different, and experience will determine how long yours should percolate.

Violent percolating or too long continued will result in a boiled brew which will be bitter and flavorless.

STEEPED COFFEE

This is the method often called "boiled coffee." The coffee should, however, be brought just to the boil, never boiled.

Use 2 level tablespoons of coffee for each standard measuring cupful of water, plus 1 extra tablespoonful "for the pot." While the water is heating, make a paste with a little cold water and the coffee, adding egg white and crushed shell to clear the coffee more quickly. When the water boils, add the coffee mixture and stir thoroughly. Bring to a boil again, put in a dash of cold water to help settle the grounds, and remove from the fire. Set on the back of the stove for a few minutes to settle.

DECAFFEINATED COFFEE

Coffees with the caffein removed furnish a most welcome beverage in cases where regular coffee cannot be taken. Prepare by any of the methods used for regular coffee, using 1 heaping tablespoon of coffee to each cup of water. If made in a percolator, percolate for 15 to 20 minutes.

CAFÉ AU LAIT

Pour equal quantities of freshly made coffee and scalded milk simultaneously into the cup.

VIENNA COFFEE

Use any type of freshly made coffee and serve with whipped cream.

AFTER-DINNER COFFEE

Use 4 level tablespoons of coffee for each standard measuring cup of water and make by any of the methods above. Serve in demitasse cups without cream.

ICED COFFEE

Brew the coffee as usual, chill, and pour into a glass containing 1 ice cube. Serve with cream and sugar or with whipped cream on top.

Freshly made coffee may be poured over ice, but it must be much stronger coffee than usual because the ice dilutes it.

COFFEE WITH LACTOSE (Coleman)

1½ oz. milk sugar (4½ tbsp.)
4 to 5 oz. strong coffee (8 to 10 tbsp.)
2 oz. cream, 18% (4 tbsp.)

By previously dissolving the milk sugar in water, 72 grams of it may be put into a cup of coffee.

Calories, 290: protein, 1 gram; fat, 10 grams; carbohydrate, 49 grams.

MALTED MILK COFFEE

(Individual rule)

1 tbsp. malted milk powder
1 tbsp. ground coffee
¾ cup boiling water
Sugar to taste

Mix the malted milk powder, coffee, and water, stirring well. Boil for 3 minutes. Add sugar if desired.

Or 1 to 4 teaspoons of malted milk powder may be put in a cup and ordinary coffee poured onto it, stirring constantly.

Calories without sugar, 38: protein, 1 gram; fat, 1 gram; carbohydrate, 6 grams.

STARCHY BEVERAGES

Starchy beverages consist of cereals or cereal products cooked thoroughly and strained before serving. The proportion is usually 1 tablespoon of either the *whole grain* or the *flour of grain* to 1 pint of water.

Nutritive value Starchy beverages have little food value unless milk or other highly nutritive material is added. Such drinks are of value when only a small quantity of nutriment can be taken.

Principles of cookery As the chief ingredient is starch, long cooking is necessary in water at boiling temperature (212°). This softens the cellulose and breaks open the starch grains, so that they can be readily digested. Time of cooking should be conscientiously kept by the clock.

Digestion The action of ptyalin is very rapid, and if these drinks are sipped slowly, so as to be thtoroughly mixed with saliva, a considerable portion of starch may be changed to sugar before reaching the intestines.

BARLEY WATER FOR INFANTS (Holt)

1 tbsp. barley flour
¼ cup cold water
1¾ cups boiling water
Pinch of salt

Blend the flour and cold water to make a smooth paste, then pour it into the briskly boiling salted water, stirring constantly. After the mixture has boiled, place it in a double boiler and cook at least 20 minutes to ½ hour and then strain through a fine wire strainer or muslin. Enough water should then be added to bring the whole up to one pint.

Some authorities say not to salt barley water for the baby under six months of age. Barley water is an astringent or demulcent drink used to reduce laxative condition. For the adult, cream or milk and salt may be added or lemon juice and sugar.

Calories, 25: protein, 1 gram; carbohydrate, 5 grams.

PEARLED BARLEY WATER FOR INFANTS (Holt)

1 tbsp. pearled barley
1 pint cold water
Pinch of salt

Wash the barley, add the cold water, and let soak 5 hours or overnight. Add a pinch of salt and boil steadily over direct heat for 4 hours, adding water from time to time to keep the quantity up to one pint. Then strain through muslin.

Some authorities say not to salt barley water for the baby under six months of age.

Calories, 36: protein, 1 gram; carbohydrate, 8 grams.

RICE WATER

3 tbsp. rice
1 pint boiling water
1 tbsp. seeded raisins
Sugar or salt.

Wash the rice, put it in a saucepan with the water and raisins, and boil gently for 1 hour. Strain, reheat, and dilute with boiling water or hot milk to the desired consistency. Season with salt or sugar and serve hot or cold. Omit the raisins in cases of bowel trouble.

Omit raisins if desired and serve plain or, if allowed, cinnamon may be cooked with the rice. This will assist in reducing a laxative condition. For variety or extra nutriment, milk may be substituted for the water.

Calories without sugar, 135: protein, 2 grams; carbohydrate, 31 grams.

TAPIOCA WATER

Add 1 tablespoon of granulated tapioca to 1 pint of briskly boiling water, stirring constantly. After the mixture has boiled, place it in a double boiler and cook 15 minutes or longer. Strain through a fine wire strainer or muslin, adding enough water to make 1 pint of the strained solution.

Calories, 53: carbohydrate, 13 grams.

TOAST WATER

1 cup stale bread, toasted
1 cup boiling water
Salt

Slice the bread thin and cut into inch squares. Dry thoroughly in the oven until crisp and a delicate brown. Measure and break into crumbs; add the water and let stand 1 hour. Rub through a fine strainer, season, and serve hot or cold. The nourishment of the bread is easily absorbed in this way and is valuable in cases of fever or extreme nausea. Milk or cream and sugar may be added.

Calories, 156: protein, 5 grams; fat, 1 gram; carbohydrate, 31 grams.

BREAD PANADA

1½ cups water
1 tbsp. sugar
2 tbsp. stale white bread crumbs
¼ cup white wine
1 tbsp. lemon juice
Nutmeg

Put the water and sugar in a saucepan and cook. Just before the mixture begins to boil, add the bread crumbs. Stir well and let boil for 3 or 4 minutes. Add the wine, lemon juice, and a grating of nutmeg. Let the mixture boil up once, then remove from the fire and keep closely covered until wanted for use.

Calories, 88: protein, 1 gram; fat, 1 gram; carbohydrate, 20 grams.

CRACKER PANADA

4 hard crackers
1 quart water
Salt
Sugar

Break the crackers into pieces and bake quite brown; add water and boil 15 minutes. Allow to stand 3 or 4 minutes, strain off the liquid through a fine wire sieve, and season with salt and a little sugar. This is a nourishing beverage for infants who are teething, and with the addition of a little wine and nutmeg is often prescribed for invalids recovering from a fever.

Calories without sugar, 140: protein, 4 grams; carbohydrate, 30 grams.

TEA

The tea of commerce is made from the leaves of a shrub (*Thea*) which grows in China, Japan, India, Ceylon, and other parts of southern and eastern Asia. Differences in flavor among teas depend not upon the variety of the shrub from which the leaves come, but upon the kind of leaves chosen and the method of curing.

The two great classes of tea are black teas and green teas. The difference lies in the method of preparation. Green teas are quickly dried and fired, and the coloring is artificial; black teas are allowed to ferment for a few hours before drying and firing. English Breakfast, Formosa, Pekoe, Orange Pekoe, Flowery Pekoe, China Black, and Oolong are black teas. Among green teas are China Green, Gunpowder, Hyson, and Japan. Ceylon and India teas may be either green or black.

Nutritive value Tea has no food value. It is a stimulant because it contains theine, an alkaloid closely related to caffein. Tea also contains tannic acid and a volatile oil which gives its characteristic flavor.

Tannic acid is a soluble, bitter substance which retards digestion. When tea leaves are placed in boiling water, the theine is extracted very rapidly; but tannic acid is less soluble, and therefore it is possible to make tea which contains very little tannic acid by letting the water stand on the leaves only a short time.

Effects Tea is mildly stimulating, hence refreshing. It removes the feeling of bodily fatigue, but the tannic acid retards the digestive action of the saliva and gastric juice, and tends to produce constipation. Tea is not, therefore, suitable for persons suffering from gastric disorders. Theine is overstimulating to the nervous system of many persons, causing restlessness, sleeplessness, and muscular tremors. It should not be given to children, nor to adults with a tendency to nervousness. To avoid the retarding effect of tea on salivary digestion, direct the patient not to sip the beverage with the meal, but to eat first and drink tea afterward. This will give the saliva time to perform its intended functions.

Principles of cookery Water to be poured on the tea leaves should be as near the boiling point as it is possible to have it. The tea should then steep for 3 to 5 minutes. Never boil tea, never use tea leaves more than once, and do not let the leaves remain in the water for too long a time. For the same strength brew, a smaller quantity of green tea leaves is required than of black.

TEA

Use ½ to 1 rounding teaspoon of tea to each standard measuring cupful of water. Scald the teapot, which should be silver, crockery, or graniteware. Put the tea in the pot, add the freshly boiling water, and let it infuse for 3 to 5 minutes. Strain into a hot cup and serve with cream or milk and lump sugar, or with sugar and a slice of lemon.

RUSSIAN TEA

Heat a cup, fill it three-fourths full of boiling water, and dip into it 1 teaspoon of tea in a tea ball or fine strainer, until strong enough. Serve hot with sugar and a slice of lemon.

ICED TEA

Fill tall glasses one-third full of shaved ice, or almost full of cracked ice, and fill with hot tea. Serve with lemon and sugar.

Tea loses some of its flavor when it stands. Therefore, letting the tea cool before making iced tea is not as satisfactory as the method above.

VARIOUS NONNUTRITIVE BEVERAGES

BRAN TEA

¼ cup wheat bran
2 cups cold water
Egg shell
Molasses
Lemon juice

Boil the bran and water 20 minutes and settle it with an egg shell or a little cold water. Sweeten with molasses. Lemon juice may be used if desired.

CINNAMON WATER

1 1-oz. stick cinnamon
1 pint boiling water

Boil together 15 minutes. Strain and serve hot or cold.

This is good in bowel trouble. The pure cinnamon is quite different from the coarse bark usually sold for cinnamon, which is really only cassia.

FLAXSEED TEA

1 tbsp. whole flaxseed
2 cups cold water
Lemon juice to taste
Sugar

Wash the flaxseed thoroughly, put in a saucepan with the cold water, and simmer 1 hour. Add lemon juice and sugar to taste and strain. If too thick, add hot water.

This is valuable in case of inflammation of the mucous membrane.

FLAXSEED AND LICORICE TEA

1 pint boiling water
1 oz. flaxseed
2 drams licorice root

Pour the boiling water over whole flaxseed and bruised licorice root, cover and cook very slowly for 4 hours. Strain.

LIME WATER

1 tbsp. slaked lime
1 quart boiled or distilled water

Put the lime and water into a corked bottle and shake thoroughly 2 or 3 times during the first hour. Allow the lime to settle, and after 24 hours carefully pour off the upper clear fluid or siphon it off into a glass-stoppered bottle. Keep tightly corked, as it absorbs carbon dioxide from the air. Keep in a cool place.

GINGER TEA

Mix 1 tablespoon of molasses with ½ teaspoon of ginger. Pour on gradually ½ cup of boiling water, and boil 1 minute. Add ½ cup of milk, and serve when thoroughly heated.

HERB TEAS

Pour 1 cup of boiling water over 2 tablespoons of herbs. Cover the bowl, set it over the teakettle, and steep 10 minutes. Sweeten if desired.

SLIPPERY ELM TEA

1 cup boiling water
2 tsp. slippery elm powder *or* piece of the bark
Sugar
Lemon juice

Pour the water on the slippery elm powder or bark. When cool, strain and flavor with lemon juice and sugar.

This is soothing in case of inflammation of the mucous membrane.

29.
BREAD

From the most remote times bread has been an important part of the diet of mankind. It is today probably more generally and extensively used in the United States than any other one foodstuff, with the possible exception of milk. It is therefore extremely important to know what constitutes good bread and what are its nutritive properties.

Composition Bread is essentially a mixture of flour and liquid—either milk or water or both. Today most peoples add a leavening agent, either yeast or baking powder; and salt, sugar, and a little fat are usually added for flavor. Breads raised with yeast are known as "yeast breads"; those raised with baking powder are called "quick breads."

NUTRITIVE VALUE

In nutritive value bread stands high among foods. It has practically no waste, and few foods yield as much energy for so little money. Combined with milk, which adds protein, fat, minerals, and vitamins to the carbohydrate in bread, it is as close to a complete food as we are likely to get. A diet of bread and milk can be perfectly balanced and will be tired of less easily than any other equally simple diet.

Bread consists of at least 60 per cent nutritive material, and from 34 per cent to 40 per cent water. It contains a large amount of carbohydrate, a moderate amount of protein, a small amount of mineral matter, and very little fat. The food value of bread is as follows:

	PROTEIN (*grams*)	FAT (*grams*)	CARBOHYDRATES (*grams*)	ENERGY VALUE (*calories*)
Boston brown, 1 small slice, 1 oz.	1.5	0.8	12.4	62
Gluten, 1 small slice, 1 oz.	7.5	1.1	9.1	77
White (commercial), 1 small slice, 1 oz.	2.6	0.6	15.7	78
Whole-wheat, 1 small slice, 1 oz.	2.9	1.1	14.4	79
Soya [1]				

[1] See the section following on soya flour.

Digestibility Bread is easily and completely digested. All breadstuffs should be eaten slowly and masticated thoroughly to give the saliva time to act upon the starch. Otherwise fermentation results or the intestines have more than their share of work to do and rebel.

FLOURS

Any cereal cleaned, crushed, and sifted to a powder may serve as the flour for quick breads. For yeast breads the flour must have a certain amount of gluten in it to give it the power of stretching—"rising"—when the entrapped gas from the yeast fermentation expands during baking. White wheat flour contains the most gluten. Whole-wheat and graham flour are now milled by processes which makes it possible to use them for yeast breads without the addition of white flour. Rye flour also may be used alone. But other flours—rice flour, potato flour, corn meal, oatmeal, barley flour, soya flour, etc.—cannot be used for bread without the addition of white flour.

Soya flour Soybean products now have a definite place in the low-starch and diabetic diets because soybeans are low in carbohydrates and high in protein of a kind which approaches the complete animal proteins.

In general there are two types of soya flour—full-fat or high-fat, and low-fat. Full-fat flour contains about 20 per cent fat and 40 per cent protein. Low-fat flour contains, according to the method by which the fat is removed, either 4½ to 8 per cent fat and 45 to 50 per cent protein, or less than 4½ per cent fat and 50 to 53 per cent protein. One ounce contains 13 grams of protein and 120 calories.

Whole-grain flours Flours which contain a large part of the bran supply more mineral matter than refined white flour. They are rich in minerals, vitamins, and proteins as well as carbohydrates.

Enriched flour To make up for the loss of nutrients in milling, white wheat flour is now enriched by the addition of minerals and vitamins by government order.

Gluten flour Gluten flour is made by washing the starch out of wheat flour. The grayish, tough, elastic mass left after this process is largely gluten; and when it is washed and dried and ground it is called gluten flour. This flour is used in diets for certain diseases, notably diabetes, where the intake of starch must be low. But the

gluten flour may contain considerable starch even after the washing, and for good results the physician should know the exact composition of the brand used.

Bran Bran bread is now extensively used in the diet of diabetic patients. Bran often contains a considerable quantity of starch, which can be washed out by putting it in a cheesecloth and washing it under the cold water tap until the water is clear, or by boiling.

Cellu flour This cellu, or cellulose, flour is a nonnutritive flour made from especially purified vegetable fiber. It serves as bulk in filling out restricted diets, such as in the Allen treatment of diabetes. By mixing with washed bran, mineral oils, and flavors, nonnutritive food substitutes can be prepared.

General Rules for Flour Mixtures Use all-purpose wheat flour unless otherwise stated.

If pastry flour is substituted for bread flour, increase the quantity two tablespoons to one cup flour.

Sift the flour before measuring.

Sift again with the dry ingredients.

TIMETABLE FOR BREADSTUFFS

Baked:	
Bread, loaf medium size	45 min. to 1 hr.
Biscuits, raised	20 to 25 min.
Biscuits, baking powder	10 to 12 min.
Muffins	20 to 25 min.
Steamed:	
Boston brown bread	3 to 4 hr.

BREAD MAKING (Yeast Breads)

The making of good bread requires care and intelligence. Use a good brand of flour and fresh yeast. Remember that yeast is a plant and must be given the proper temperature in order to grow. Every utensil must be sterile, and the liquid also should be sterilized—the milk scalded and the water boiled. Let the liquid cool to lukewarm before using. For rolls and rich breads, beaten eggs or egg yolks may be added. The shortening should be a pure, sweet fat. Any good type may be used.

Kneading Yeast breads are mixed by hand, unless a bread mixer is used. The process is called kneading. Turn the mixed dough onto a lightly floured board. Wash the hands thoroughly and rinse in hot water, then rub with flour. Fold the dough forward with the finger-tips, then press down in a rolling motion with the palms. It should often be turned over and a quarter around. If the dough sticks to the board, add a little flour, but as little as possible. Knead about 5 minutes, then cut off a small piece of dough and see whether the air bubbles are small and well distributed. If not, knead longer. With experience, the feel of kneaded dough will easily be recognized. The second kneading, after the dough has risen once, should be only long enough to make it smooth.

Shaping To shape loaves, pull the dough apart into the right number of pieces, each piece about one-third as large as the loaves should be. Fold the edges underneath and see the top is perfectly smooth. Place in greased loaf pans.

Rising Set the mixer, bowl, or pans in a clean place, covered. If the bread is to rise overnight, the best temperature is 65° to 70° F. For rising in the daytime, 75° to 80° brings quicker results. The dough should at least double in bulk. For the first rising, this may take from 2½ hours to overnight, depending on the amount of yeast used. For the second rising it will take about 50 minutes. To shorten the rising time given in a recipe, use more yeast. To lengthen it, use less. About one-fourth the amount of yeast should be used for overnight rising.

Baking Bread requires a hot oven. The dough should rise for the first 15 minutes it is in the oven, then the rising should cease. Have the oven at about 400° F. when the bread goes in, and reduce to 350° F. after the first 15 minutes. Do not open the oven door any more than necessary, but after half an hour open it to see if the bread is in danger of burning. If it is too brown, leave the oven door open the rest of the time. Bread should bake in 45 minutes to an hour.

The pans in the oven should not touch each other nor the walls of the oven.

When the bread is removed from the oven, take it out of the pans immediately, rub the top with butter to make a tender crust, and place side down on a rack or wire basket until cool. Bread should be kept in a tin receptacle.

BRAN NUT BREAD

(2 loaves)

1 cake compressed yeast
1 tbsp. sugar
⅓ cup lukewarm water
4½ cups flour
2½ cups bran
2 cups scalded milk, cooled
2 tbsp. shortening
1 egg, well beaten
⅓ cup brown sugar
¾ tsp. salt
1 cup chopped dates
1 cup chopped walnuts

Dissolve the yeast and 1 tablespoon of sugar in the lukewarm water. Mix the flour and bran together. Add the milk, scalded and cooled, the melted shortening, well-beaten egg, sugar, salt, walnuts, and dates, mixing all thoroughly. Knead well, using more white flour if the dough is too soft, but keep as soft as possible. Cover, let rise in a warm place about 2 hours. Knead down again and let rise ½ hour. Mold into loaves and let rise ¾ hour. Bake in a moderate oven (375° F.) for 1 hour.

Calories, 4566: protein, 122 grams; fat, 123 grams; carbohydrate, 743 grams.

GLUTEN BREAD

1 cake compressed yeast
2 cups lukewarm water
3½ cups gluten flour
½ tsp. salt

Dissolve the yeast in a little of the lukewarm water. Mix and sift the flour and salt, then add the yeast and water. Mix to a stiff dough and knead thoroughly, using enough flour to keep the dough from sticking to the board. Let the dough rise to twice its size, then knead slightly. Form into a loaf and place in the pan. Let rise again, then bake for 45 minutes in a moderate oven.

Gluten bread may be made the same as white bread, omitting the shortening.

Keep gluten bread in a dry place where the air can circulate around it.

Calories, 1863: protein, 208 grams; fat, 9 grams; carbohydrate, 235 grams.

SOYA BREAD [2]

(3 loaves)

2¾ cups scalded milk
2 cakes compressed yeast
3 tbsp. sugar
3 tsp. salt
2 tbsp. fat
½ cup sifted soya flour
8¼ cups sifted flour

Cool ½ cup of the milk to lukewarm and soften the yeast in it. Mix

[2] U. S. Department of Agriculture Bulletin AWI-73.

the sugar, salt, and fat, then pour the rest of the milk, while still hot, over the mixture. Cool. Mix the soya flour and all but ½ cup of the white flour. Stir the liquid mixture into the flour and mix thoroughly. Knead on a lightly floured board, working in as much of the unused ½ cup of flour as is needed to make the dough soft, smooth, and elastic. Let the dough rise in a warm place until double its size. Punch it down to let some of the gas escape, turn it upside down, then let rise again to double its size. Punch down again, divide into thirds, mold into loaves, and place in greased bread pans. Let rise again until double in bulk.

Bake in a moderately hot oven (385° F.) for 15 minutes, then at moderate heat (350° F.) for the rest of the time. Bake 45 minutes to 1 hour. Anything with soya in it browns faster than usual, so the bread should be carefully watched to prevent burning.

Calories, 4431: protein, 160 grams; fat, 70 grams; carbohydrate, 791 grams.

WHITE BREAD

(2 loaves)

- 1 cake compressed yeast
- 2 tbsp. lukewarm water
- 2 tbsp. sugar
- 2 tsp. salt
- 3 tbsp. shortening
- 2 cups scalded milk
- 6 cups flour

Dissolve the yeast in the lukewarm water. Put the sugar, salt, and melted shortening into a bowl and pour the scalded milk, cooled to lukewarm, over it. Add the yeast and half the flour, then beat until smooth. Add the rest of the flour and mix well. Turn out on a lightly floured board and knead until smooth and satiny. Place the dough in a greased bowl, cover, and let rise about 2 hours, or until double in bulk. Knead again, shape into 2 loaves, place in greased bread pans, then cover and let rise again until double in bulk, about 1 hour. Bake in a hot oven (400° F.) for 15 minutes, then reduce heat to 350° F. Bake 30 to 35 minutes longer.

Calories, 3282: protein, 90 grams; fat, 71 grams; carbohydrate, 571 grams.

RYE BREAD

Follow the recipe for white bread, using 4 cups of rye flour and 2 cups of white flour. If preferred, all rye flour may be used.

Calories, 3704: protein, 93 grams; fat, 72 grams; carbohydrate, 672 grams.

WHOLE-WHEAT BREAD

Follow the recipe for white bread, using 3 cups of white flour and 3 cups of whole-wheat flour, or all whole-wheat may be used if preferred. Brown sugar or molasses may be substituted for the sugar.

Calories, 3609: protein, 110 grams; fat, 76 grams; carbohydrate, 622 grams.

ROLLS

(1½ to 2 dozen)

- 1 cake compressed yeast
- 1 cup scalded milk
- ¼ cup sugar
- 1 tsp. salt
- 1 egg, well beaten
- ⅓ cup melted shortening
- 4 cups flour

Dissolve the yeast in a little of the scalded milk, cooled to lukewarm. Add the rest of the milk, then stir in the sugar, salt, well-beaten egg, half the shortening and half the flour. Beat until smooth, add the remaining flour, and mix well. Mix in the rest of the shortening. Knead on a floured board until the dough is smooth and satiny. Cover and let rise until double in size. Form into the desired shapes, as follows:

Parker House Rolls: Roll the dough to ¼ inch thickness on a floured board. Cut into rounds, crease the center of each round with a knife handle. Brush one half with melted butter and fold.

Cloverleaf Rolls: Make 3 small balls of dough for each roll. Put the 3 balls together in the cup of a greased muffin tin and brush with melted butter.

Butter Semmels: Roll the dough to ¼ inch thick on a floured board. Cut into 3-inch squares and put ½ teaspoon of hard butter in the center of each square. Pinch the edges of the squares together diagonally, moistening the edges with water if they will not stick. Place on a greased pan or baking sheet folded side down.

Bowknots: Roll the dough to ½ inch thick on a floured board. Cut into ropes half an inch wide and 6 to 8 inches long. Tie each rope loosely in a bow.

Crescents: Take a quarter of the dough and roll it into a circle 9 inches in diameter and ¼ inch thick. Cut the circle into 10 or 12 wedge-shaped pieces and roll each piece like a jelly roll, beginning at the curved edge. Do the same thing with the other three-quarters of dough, one quarter at a time.

Arrange the shaped rolls on a greased pan or baking sheet, brush with melted butter, cover and let rise until double in bulk. Bake 15 to 20 minutes in a moderately hot oven (400° F.).

Calories, 2757: protein, 64 grams; fat, 96 grams; carbohydrate, 410 grams.

Note: For richer rolls, increase the sugar to ½ cup, the shortening to ½ cup, the salt to 1½ teaspoons, the flour to 4½ or 5 cups, and use 2 eggs or 4 egg yolks.

ICEBOX ROLLS [3]

(4 dozen small)

- 2 yeast cakes
- 1/3 cup lukewarm water
- 2/3 cup shortening
- 1/3 cup sugar
- 1 tbsp. salt
- 1 cup boiling water
- 1 cup milk
- 7 to 8 cups flour
- 2 eggs, beaten

Dissolve the yeast in the lukewarm water. Dissolve the shortening, sugar, and salt in the boiling water. When this mixture is lukewarm, add the dissolved yeast and milk. Stir in about 3 1/2 cups of flour, add the beaten eggs, then enough more flour to make a dough that can be handled, but keep it as soft as possible. Turn onto a lightly floured board and knead until the dough is smooth and elastic to the touch. Put in a large, well-greased bowl, cover, and let stand at room temperature until doubled in bulk (about 1 hr.). Work the dough down lightly in the bowl, cover close, and set in the refrigerator overnight, or until needed. The dough will rise a little even in the refrigerator, so the bowl should be deep. Shape while still ice-cold and bake at once.

Calories, 5205: protein, 120 grams; fat, 181 grams; carbohydrate 774 grams.

TOAST

Starch is the principal constituent of ordinary wheat bread. When subjected to a high degree of dry heat, starch is changed into dextrin, an easily digested carbohydrate intermediate in structure between starch and sugar. In the ordinary cooking of bread the starch in the outer layer is changed to dextrin, which gives the crust its sweet flavor. When a slice of bread is toasted, the outer layer undergoes the same change. Toasting bread also takes out moisture so that it has to be more thoroughly moistened with saliva, hence more easily digested.

CREAM TOAST

(Individual rule)

- 1/2 tbsp. butter
- 1/2 tbsp. flour
- 1/2 cup milk
- 1/8 tsp. salt
- 1 1/2 thick slices bread, toasted

Melt the butter in a saucepan. Stir in the flour thoroughly, then remove

[3] *Everybody's Cookbook*, edited by Isabel Ely Lord. New York: Harcourt, Brace & Co., 1937. Reprinted by permission.

from the fire and slowly add the milk. Add the salt and put back on the fire for 5 minutes, stirring constantly. Pour over the toast and serve. If the toast must be very soft, dip it quickly into boiling salt water before adding the cream sauce. Add a little clam broth to the cream sauce if desired.

Calories, 268: protein, 8 grams; fat, 12 grams; carbohydrate, 32 grams.

FRENCH TOAST

Beat an egg lightly in 1 cup of milk. Season with salt and pepper. Dip the slices of bread into the egg mixture and fry in a hot pan. Serve with maple syrup or jam.

MELBA TOAST

Cut the bread very thin, lengthwise of the loaf. Cut into pieces about 2 inches by 5 inches. Bake in a pan in a slow oven until thoroughly dried out and brown. Melba toast will keep indefinitely in a dry place. Put into the oven a few minutes before serving to freshen it.

MILK TOAST

Use 1 cup of rich milk for 3 slices of toast. Heat the milk in a saucepan and season with a saltspoon of salt for each cup of milk. Butter may be added if desired, but the dish is more delicate without it. Pour the hot milk over the toast and serve at once. Clam broth may be added to the milk if desired.

WATER TOAST

Dip dry toast quickly in boiling salted water, allowing ½ teaspoon of salt to 1 cup of water. Spread the toast with butter and serve immediately on a hot plate.

QUICK BREADS

Quick breads, so called because it takes less time to make them than yeast breads, use baking powder or soda or both for leavening. The combining of the dry ingredients with the liquids in quick-bread recipes should be left to the last minute because baking powder and soda begin to act the moment they come in contact with moisture.

The method of mixing and handling determines the quality of biscuits. The flour and fat mixture should be stirred enough to distribute the fat evenly, but not until smooth. Just enough liquid should be used to make the dough soft enough to handle. Too much liquid

makes a sticky dough and poorly shaped biscuits. Not enough liquid makes tough biscuits.

BAKING POWDER BISCUITS

(20 small)

- 2 cups sifted flour
- 4 tsp. baking powder
- ¾ tsp. salt
- 4 tbsp. shortening
- ¾ cup milk or water, or a mixture of both

Sift the flour, baking powder, and salt together twice. Work in the shortening with two knives or a pastry blender, blending until the mixture has the consistency of coarse corn meal. Add the milk to the flour mixture very gradually, mixing with a knife to a soft dough. More liquid may be necessary. Turn the dough onto a lightly floured board and roll the mass with a knife to coat it with flour. Knead slightly, then roll into a sheet ¾ inch thick. Cut into rounds, place in a shallow pan or on a baking sheet, and brush the tops with melted butter, to give a rich brown outside. Bake about 15 minutes in a hot oven (450° F.).

Calories with all milk, 1455: protein, 30 grams; fat, 69 grams; carbohydrate, 178 grams.

BOSTON BROWN BREAD

(3 loaves)

- 1 cup yellow corn meal
- 1 cup rye flour or bran
- 1 cup whole-wheat or graham flour
- 1 tsp. salt
- 2 tsp. soda
- 2 cups sour milk
- ¾ cup molasses
- 1 cup raisins if desired

Mix the corn meal, rye flour, and whole-wheat flour and salt. Stir the soda into the sour milk and add to the dry ingredients. Then add the molasses and the raisins if used. The mixture should be stirred just enough to moisten the dry ingredients. Do not beat. Pour the dough into greased molds, filling the molds two-thirds full. The recipe will fill 3 1-quart molds. Cover the molds with greased covers, close-fitting, or heavy waxed or parchment paper. Steam 3 to 4 hours. If desired, bake in a slow oven (250° F.) for 20 minutes with the covers off to dry out the tops. Remove from the molds and serve hot, or wrap in waxed paper until ready to use.

Calories,[4] 2498: protein, 60 grams; fat, 25 grams; carbohydrate, 508 grams.

[4] Calculated with rye and whole-wheat flour and without raisins.

BRAN BREAD

(1 loaf)

- 2 cups flour
- 3 tsp. baking powder
- ⅔ tsp. salt
- 2 cups bran
- 1⅓ cups milk
- 1 egg, well beaten
- 2 tbsp. sugar or molasses
- 2 tbsp. melted shortening

Sift together the flour, baking powder, and salt. Add the bran. Add the milk to the well-beaten egg then combine with the flour mixture, beating all the time. Add the sugar or molasess, and last the shortening. Bake for 1 hour in a medium hot oven (375° F.).

For bran nut bread, add ¾ cup of chopped nuts.

Calories, 1973: protein, 63 grams; fat, 56 grams; carbohydrate, 304 grams.

BRAN MUFFINS

(12 small)

- 1 cup flour
- 3 tsp. baking powder
- ½ tsp. salt
- 1 cup bran
- 1 cup milk
- 1 tbsp. molasses
- 2 tbsp. brown sugar
- 1 egg, well beaten
- 1 tbsp. melted butter

Sift together the flour, baking powder, and salt. Add the bran, milk, molasses, and sugar, then the well-beaten egg, and finally the melted butter. Bake in greased gem pans in a hot oven (400° F.) for 25 to 30 minutes.

Calories, 1173: protein, 38 grams; fat, 31 grams; carbohydrate, 185 grams.

CORN-MEAL GEMS

(10 small)

- ¾ cup flour
- 2 tbsp. sugar
- 3 tsp. baking powder
- ½ tsp. salt
- ¾ cup yellow corn meal
- 1 cup milk
- 1 egg, well beaten
- 1 tbsp. melted butter

Sift the dry ingredients into a mixing bowl, add the milk and well-beaten egg, and the melted butter. Put into well-greased hot gem tins and bake in a hot oven (400° F.) 20 to 25 minutes.

If sour milk is used, add ½ teaspoon soda and reduce baking powder to 1½ teaspoons.

Calories, 1180: protein, 33 grams; fat, 30 grams; carbohydrate, 195 grams.

CORN MUFFINS
(18 small)

2 cups corn meal
1 cup scalded milk
1 tbsp. butter
1 cup cold milk
2 eggs, beaten separately
½ tsp. salt
½ cup flour
2 tsp. baking powder

Put 1 cup of corn meal in a mixing bowl, add the hot milk in which the butter is dissolved, and cover the bowl. Allow the mixture to stand until cool.

To the above mixture add the cold milk and the egg yolks, well beaten, saving a little of the milk to rinse the egg bowl. Then add the flour, the other cup of corn meal, salt and baking powder sifted together, and beat the mixture well. Lastly fold in the well-beaten egg whites. Bake in warmed gem tins in a hot oven (400° F.) for 25 to 30 minutes. If desired 1 tablespoon of sugar may be added.

Calories, 1871: protein, 61 grams; fat, 47 grams; carbohydrate, 302 grams.

WHITE MUFFINS
(12 small)

2 cups flour
1 tsp. salt
3 tsp. baking powder
2 tbsp. sugar
2 tbsp. butter
2 eggs, well beaten
1 cup milk

Sift the dry ingredients into a mixing bowl, add the well-beaten eggs anc the milk gradually, then the butter melted and beat all well together. Have gem pans well greased and heated; fill two-thirds full and bake in a hot oven (400° F.) 15 or 20 minutes. Put a little melted butter on each gem before putting it into the oven. They are sufficiently cooked if, upon testing a fine knitting needle or broom straw comes out dry.

Calories, 1468: protein, 46 grams; fat, 48 grams; carbohydrate, 215 grams

SANDWICHES

Sandwiches form an acceptable and popular way of serving bread They are especially adapted for picnics, box or school luncheons, anc social affairs. Day-old bread makes the best sandwiches. It should b sliced thin and buttered, and the sandwiches may be cut into fanc shapes.

Sandwiches may be kept fresh by wrapping in waxed paper or by covering with a moist napkin until ready to serve.

The variety of fillings is infinite, the following being only a few of those which may be invented.

BREAD-AND-BUTTER SANDWICHES

Butter bread slightly, cut very thin, and put slices together. Cut into fancy shapes.

BOSTON BROWN BREAD SANDWICHES

Cut Boston brown bread into thin slices. Butter and add a thin round of white bread. The combination of the two makes a pleasing variety.

CHEESE SANDWICHES

Chop stuffed olives fine, add an equal quantity of cream cheese, and spread on bread-and-butter sandwiches. A lettuce leaf may be added.

CHICKEN SANDWICHES

Chop cold chicken, add mayonnaise dressing, and spread on bread-and-butter sandwiches.

Or, instead of mayonnaise, moisten with strong chicken broth and season with salt and pepper. Minced celery may be added.

CLUB SANDWICH

2 slices toast	2 slices tomato
2 slices cooked bacon	3 tbsp. mayonnaise dressing
2 large leaves lettuce	4 olives
3 tbsp. chopped chicken	½ egg

Toast the bread, distribute the fillings between the layers, cut diagonally, and serve.

Calories, 689: protein, 20 grams; fat, 52 grams; carbohydrate, 35 grams.

DATE SANDWICHES

Combine chopped dates with chopped pecan meats or cottage cheese and spread on slices of whole-wheat bread spread with thick, sweet cream or soft butter.

EGG SANDWICHES

Chop hard-cooked eggs fine, season with salt, pepper, and a little mustard, and spread between buttered slices of bread. A little mayonnaise may be added.

FRUIT SANDWICHES

Spread bread-and-butter sandwiches with stewed dates, figs, or prunes, seasoned with a little lemon juice. Or chop dates, raisins, and nuts very fine and moisten with fruit salad dressing.

LETTUCE OR NUT SANDWICHES

Spread bread-and-butter sandwiches with a little mayonnaise dressing, lay in fresh, crisp lettuce leaves washed and dried thoroughly, and cut even. For nut sandwiches, add chopped nuts to the mayonnaise.

PEANUT-BUTTER SANDWICHES

Spread peanut butter on buttered slices of bread. Cut in fancy shapes. Crackers may be used in place of bread.

30. CAKE

Cake is a sweetened combination of flour, egg, liquid, leavening, and flavorings, baked in the form of loaves, layers, or small forms such as cupcakes, cookies, bars, etc. A good cake should be moist but not sticky, easily broken but not crumbly, light and tender.

Because it is tender and tends to prevent proper mastication, and because it contains a considerable amount of fat, mixed with protein and carbohydrate, cake is not easily digested by a delicate person. It has, however, flavor appeal and may be used with discretion. Because of its high sugar content, cake has more calories than the other specific nutrients.

Flour Cakes may be made with either all-purpose flour or cake flour. The latter is often called pastry flour, but the true pastry flour is not as fine as cake flour and is mainly distributed to commercial bakers.

Cake flour generally makes a fluffier cake, but bread flour is adequate. A substitute for cake flour is to take out 2 tablespoons of all-purpose flour from each cup, and in their place use 1 to 1½ tablespoons of cornstarch.

Leavening The two methods of making cake light are by means of air and of gas. Air is introduced by beating, or by the addition of beaten eggs, as in sponge cake. When the lightness is entirely dependent upon air, the white and yolks of eggs should be beaten separately.

Gas may be generated from within by combining an acid or acid salt with a carbonate and adding moisture, as cream of tartar and bicarbonate of soda, or sour milk and soda, or molasses and soda. The combination of both air and gas is used to raise butter cakes.

Liquid Milk, sweet or sour, is generally used in cakes. Sour milk (or buttermilk) makes the cake more tender. It is possible to use water, but the cake will be tougher. If water is used, add ½ tablespoon more shortening for each cup.

Shortening Butter is supposed to be the best shortening for cakes, although other shortenings may be used. In a plain butter cake the uses of fat other than butter might be detected, but for any cake with fruits, nuts, or frosting vegetable or animal fats are as satisfactory as butter. Chicken fat is particularly good.

Directions for making Before blending the cake batter, see that the oven is at the right temperature for baking and the pans greased with a little unsalted fat and dredged with flour. The pans may be lined with paper to prevent the cake from burning on the bottom when it requires long baking, or when the oven bakes too quickly on the bottom.

Have all ingredients at hand and measured before starting to mix. Sift the flour before measuring, then sift again with the dry ingredients. Use a round-bottomed bowl and a wooden spoon for mixing. Beat rather than stir the mixture, and fold in the ingredients.

Pour the batter into cake pans, slightly higher on the sides than in the center, because cake rises more quickly in the center, and place immediately in the oven. Layer cakes need a hotter oven than loaf cakes.

If the cake is properly baked, it will rise but not brown during the first quarter of the baking time. In the second quarter it will become slightly browned, in the third well browned. In the fourth quarter it will shrink from the sides of the pan.

If the oven is too hot, a crust will form over the top before the cake has risen enough, and the cake will break open on the top. If the oven is too cool, the cake will rise too much and be coarse-textured. If the top of the cake browns too quickly, cover it with a piece of light-weight paper, slightly buttered on the side next to the cake.

Cake is done when a cake tester comes out dry, or when the cake feels firm and shrinks slightly from the edges of the pan. In looking at a cake while baking, open the oven door slightly and only for a moment. Do not jar the door in closing it and do not move the pans until after the second quarter of the baking period. Then, if it is not browning well, move it from the bottom part of the oven to the upper shelf.

BUTTER CAKES

Butter cakes includes all cakes which call for shortening, and the leavening is baking powder, soda, or both.

BUTTER CAKE

(2 8-inch layers or 1 loaf)

- 2 cups sifted flour
- 3 tsp. baking powder
- ½ tsp. salt
- ½ cup butter or other shortening
- 1 cup sifted sugar
- ⅔ cup milk
- 1 tsp. vanilla
- 3 egg whites, beaten light

Sift the flour once, measure, add baking powder and salt, and sift together three times. Cream the shortening until light and fluffy, then gradually add the sugar and cream the two together. Add the dry ingredients to the creamed mixture alternately with the milk, a little at a time. After each addition, beat until smooth. Add the vanilla and fold in the egg whites. Pour into well-greased loaf or layer pans and bake: Loaf, 30 minutes at 350° F., then 15 minutes at 375° F. Layers: 20 to 25 minutes at 375° F.

Calories with butter, 2626: protein, 39 grams; fat, 101 grams; carbohydrate, 391 grams.

CUPCAKES OR PLAIN LOAF

(18 small cakes or 1 loaf)

- 2 eggs
- 5 tbsp. butter or other shortening
- ¾ cup sugar
- ½ cup milk
- 1½ cups sifted flour
- 2 tsp. baking powder
- ½ tsp. salt
- 1 tsp. flavoring

Separate the eggs and beat the yolks and whites. Cream the butter, add the sugar gradually, then the well-beaten yolks. Add the milk alternately with the dry ingredients sifted together. Beat well and fold in the flavoring and the stiffly beaten egg whites. Pour into well-greased gem pans or into a loaf pan lined with buttered paper. Bake cupcakes at 375° F. for 20 to 25 minutes. Bake the loaf at 350° F. for 30 minutes, then 15 minutes at 375° F.

The cake may be varied by adding ¼ cup of currants, or a few raisins and a little citron or mixed spices, or a little melted chocolate.

Calories, with shortening, 2149: protein, 35 grams; fat, 93 grams; carbohydrate, 293 grams.

DATE BRAN CAKE

(12 small cakes or 1 loaf)

3 tbsp. lard
¾ cup sugar
¼ cup molasses
¾ cup warm water
Pinch of soda
1½ cups bran
1½ cups flour
½ tsp. salt
1 tsp. nutmeg
1 tsp. cinnamon
3 tsp. baking powder
1 cup chopped dates

Cream the lard with the sugar. Add the molasses and mix well, then add the warm water and soda. Stir in the bran. Sift together the flour, salt, nutmeg, cinnamon, and baking powder and add to the bran mixture. Add the chopped dates. Mix all thoroughly and pour into well-greased gem pans or a loaf pan lined with buttered paper. Bake the loaf 35 to 40 minutes at 375° F.; the cupcakes 20 to 25 minutes at 375° F.

Calories, 2788: protein, 38 grams; fat, 53 grams; carbohydrate, 541 grams.

GINGERBREAD

¼ cup brown sugar
1¾ cups flour
½ tsp. soda
1 tsp. baking powder
1 tsp. ginger
1 tsp. cinnamon
½ tsp. cloves
4 tbsp. melted shortening
½ cup molasses
½ cup boiling water
1 egg, well beaten

Sift the dry ingredients together, then combine with the other ingredients in the order listed. Bake in a shallow cake pan or in gem pans at 350° F. The large cake will take 45 to 50 minutes, the gems about 30 minutes.

If desired, add ½ cup floured raisins.

Calories, 1889: protein, 28 grams; fat, 68 grams; carbohydrate, 291 grams.

SPONGE CAKES

A true sponge cake has no shortening in it and no leavening except the air beaten in with the eggs. White sponge cakes, or angel cakes, are made with egg white only. Yellow sponge cakes contain the whole egg.

ANGEL FOOD CAKE

1 cup cake flour
1¼ cups egg white
¼ tsp. salt
1 tsp. cream of tartar
½ tsp. vanilla
¼ tsp. almond extract
1½ cups sifted sugar

Sift the flour before measuring, then sift twice again. The egg whites should be at room temperature before beating. Beat until light and frothy, then sprinkle the salt and cream of tartar over the top. Continue beating until the egg white is stiff enough to form peaks but not dry. Fold in the sugar gradually, 2 tablespoonfuls at a time. Sift about ¼ cup of flour at a time over the top of the mixture. Fold in the flour with a wire whip or a spoon. Pour into an ungreased tube pan and bake in a slow oven (300° F.) about 1 hour. Do not disturb the cake during the baking or it will fall. When the cake is done, leave it in the pan but turn the pan upside down and let the cake cool for about an hour before taking it out.

Calories, 1732: protein, 43 grams; fat, 1 gram; carbohydrate, 388 grams.

SPONGE CAKE

1 cup cake flour
5 or 6 eggs
⅛ tsp. salt
1 cup sugar
Grated rind and juice of 1 lemon

Sift the flour before measuring, then sift twice again. Separate the eggs. Beat the egg white until light and frothy, then sprinkle the salt over the top. Continue beating until the whites are stiff enough to form peaks but not dry. Gradually beat in the sugar, sprinkling 2 tablespoonfuls at a time over the top of the egg whites. Beat the yolks until thick and lemon-colored and add the lemon juice and rind. Continue beating until the yolk mixture is very stiff. Gently fold the beaten whites into the yolks, then add the flour, sifting ¼ cup at a time over the egg mixture. Pour into an ungreased tube pan and bake in a moderate oven (325° F.) about 1 hour. Remove the pan from the oven and turn upside down for 1 hour while the cake cools.

Calories, 1677: protein, 47 grams; fat, 33 grams; carbohydrate, 298 grams.

MOCK SPONGE CAKE

4 eggs, separated
1 cup powdered sugar
Rind and juice of half a lemon
3/4 cup flour
1/2 tsp. salt
1 1/2 tsp. baking powder

Beat the egg yolks until thick and lemon-colored, add the sugar and lemon. Sift the flour, baking powder and salt, and add to the yolks, beating about 5 minutes. Beat the egg whites until stiff but not dry and fold into the yolk mixture. Bake in an ungreased tube pan at 325° F. for about 1 hour. Remove from the oven and turn the pan upside down to cool for an hour.

Calories, 1348: protein, 34 grams; fat, 24 grams; carbohydrate, 250 grams.

FROSTINGS

BOILED FROSTING

1 cup sugar
1/4 tsp. cream of tartar
1/3 cup cold water
1 egg white
1/4 tsp. flavoring

Boil together the sugar, cream of tartar, and water without stirring until it forms a thread when dropped from the spoon at 238° F. Cool slightly. Beat the egg white until stiff but not dry and beat in the sugar syrup. Add any flavoring to taste. Beat until thick and spread quickly.

For variety add chocolate, chopped nuts, or coconut, etc.

Calories, 852: protein, 3 grams; carbohydrate, 210 grams.

BROWN-SUGAR FROSTING

1 tbsp. strong coffee
1 cup brown sugar
1 egg white

Boil the coffee and sugar together until it spins a thread from a spoon. Beat the egg white stiff but not dry, and when the coffee syrup has cooled a little, pour it over the egg white and beat until thick. A little cocoa may be added.

Calories, 650: protein, 3 grams; carbohydrate, 160 grams.

31.
CEREALS

Cereal grains—wheat, rye, corn, oats, barley, and rice—are the staple article of man's diet. They are the most important of all of the foods of vegetable origin, and for a large proportion of American families they may comprise as much as one-fourth of the total food eaten.

Grains are easily and cheaply grown and may be stored for long periods without deterioration. They are easily cooked and furnish a palatable and readily digestible article of diet.

Composition The chemical composition of some of the most common cereals is shown in the table below:

	WATER (*gms.*)	PROTEIN (*gms.*)	FAT (*gms.*)	CARBOHYDRATE (*gms.*)	CALCIUM (*gms.*)	PHOSPHORUS (*gms.*)	IRON (*gms.*)
Barley, pearled	11.5	11.1	1.0	78.8	0.016	0.181	0.0020
Corn meal, yellow	12.5	8.3	1.2	78.0	0.010	0.190	0.0010
Rice, white	12.3	7.4	0.5	79.5	0.009	0.096	0.0007
Rolled oats	7.7	14.0	7.5	68.0	0.055	0.392	0.0050
Rye flour, light	12.5	8.9	0.9	78.5	0.018	0.290	0.0013
Soya flour	7.5	42.5	6.5	13.6	0.325	0.014	0.0130
Whole-wheat flour	12.4	13.0	2.0	72.4	0.038	0.092	0.0038

As the table shows, the carbohydrate content of cereals is very high. They are moderately rich in protein and contain a fairly large amount of minerals. Cereal breakfast foods are similar in composition to the grains from which they are made, except that finely milled cereals contain little cellulose and are relatively poor in ash. They are chiefly fuel foods because of their high carbohydrate content, most of which is starch. Their content of protein becomes important when consideration is given to the relatively large amounts eaten. Although proteins from cereal grains are incomplete in that they are deficient in one or more of the essential amino acids, proteins from different cereals tend to supplement each other in this respect.

The husk and bran layer of grains are made up largely of cellulose,

which is valuable as roughage. Much of this is removed, however, in the milling process. A large part of the mineral and vitamin content is also contained in the bran. These nutrients are also removed during milling of refined cereals, hence the emphasis on whole-grain products today. Wheat, oats, and soybeans are the best sources of the vitamin B complex, and yellow corn meal contains some vitamin A.

Cereal products yield on the average between 1600 and 1800 calories per pound. Soybeans contain 1590.

1 POUND	PROTEIN (*grams*)	FAT (*grams*)	CARBOHYDRATE (*grams*)	ENERGY VALUE (*calories*)
Corn meal	37.7	5.4	354.0	1614
Cornstarch	...	..	408.0	1632
Flour, white	49.0	4.1	345.0	1611
Flour, whole-wheat	59.0	9.1	329.0	1633
Hominy	38.6	3.4	358.0	1620
Rice	33.6	2.3	361.0	1599
Rolled oats	63.6	34.0	309.0	1796
Soya flour	193.0	29.5	61.7	1287

Digestibility For the normal healthy person cereal foods when cooked adequately are wholesome and, in general, easily digested. Their digestibility is greatly influenced by the way they are prepared and the thoroughness with which they are masticated.

Care Cereals should be kept in a cool, dry place, preferably in tightly closed containers to prevent insects from entering and to keep out moisture, which makes them soggy and musty.

Principles of cookery Cooking of cereals accomplishes three purposes: it softens and breaks down the cell walls surrounding the starch; it makes the starch more easily digested; and it brings out the flavor.

Cooking to convert nutrients into more digestible forms is very important in the case of cereals. The starch in these foods is contained within the cellular structure made up of indigestible fiber or cellulose. During milling there is some mechanical breakdown of this material, but thorough cooking is required for complete disintegration.

Parching is one of the simplest methods of cooking grains. The invisible moisture in the cells is expanded by the heat and the cell walls burst. Some of the starch is also made soluble or changed to dextrin by this process. The digestibility of protein seems to be lessened

by cooking at high temperatures, but the starch can be made almost perfectly digestible.

The softening of cellulose is more perfectly accomplished by cooking *for a long time* in the presence of a large amount of moisture, as in steaming, or cooking with water or milk in a double boiler. The glutinous material which surrounds the starch grains and prevents their digestion is disintegrated so that the digestive juices can act. In general, the more crude fiber a cereal contains, the longer it should be cooked. For example, oats require more cooking than rice; whole or partially crushed grains than finely ground ones.

There is danger in undercooked cereals, not only of loss of valuable nutriment through failure of digestion, but of irritation of the alimentary tract. This should be especially remembered in preparing partially cooked breakfast foods.

When cereals are cooked in water some of it is absorbed, and soluble substances in the food pass into the remaining water. If this is thrown away, as when rice is boiled in a large quantity of water and subsequently drained dry, a considerable part of the nutriment is lost. For this reason steaming is a preferable method. Rice water frequently contains enough dissolved starch to form a jelly on cooling. Practical application of the fact that certain nutrients in cereals are soluble is made in the preparation of all kinds of cereal waters and starchy jellies.

In cooking all cereal products, the following points should be observed:

1. Use a double boiler.
2. Observe the correct proportions of cereal, water and salt.
3. Cook over water at boiling temperature (212° F.)
4. Watch the time by the clock and always cook the full time prescribed, preferably longer.
5. Serve attractively.

Improper cooking and poor serving are largely responsible for unpopularity of cereal foods.

BREAKFAST FOODS

For cooking patent or prepared cereals, follow the directions on the package, allowing twice the time given for cooking.

Method of cooking In all recipes for breakfast foods, use the following method: Put the boiling water in the top of a double boiler. Add the salt, then stir in the cereal gradually to prevent lumping. Stir often during cooking. The first 5 minutes of cooking may be over direct fire.

CREAM OF WHEAT

30 grams cream of wheat (4 tbsp.)	1¼ cups boiling water
	Salt to taste

Cook 15 to 20 minutes. Yields 12 tablespoons or ¾ cup of cooked cereal. Calories, 108: protein, 4 grams; carbohydrate, 23 grams.

CORN-MEAL MUSH

30 grams corn meal (4 tbsp.)	1¼ cups boiling water
	Salt to taste

Cook 45 minutes to 1 hour. Yields 14 tablespoons or ⅞ cup of cooked cereal.

Calories, 107: protein, 2 grams; carbohydrate, 24 grams.

FARINA

30 grams farina (4 tbsp.)	1⅛ cups boiling water
	Salt to taste

Cook 15 to 20 minutes. Yields 12 tablespoons or ¾ cup of cooked cereal Calories, 108: protein, 4 grams; carbohydrates, 23 grams.

HOMINY

Hominy, or ground corn, comes coarse or fine. The coarse, or whole kernel, hominy is called samp; the fine is known as hominy grits.

HOMINY GRITS AND DATES

30 grams hominy grits (3 tbsp.)	¼ tsp. salt
1¼ cups boiling water	6 dates

Cook the hominy, water, and salt for 2 hours in the top of a doubl boiler. If the mush seems too thick, add more boiling water. Stone and cho

the dates and add to the cereal 3 minutes before serving. Yields 11 tablespoons or ⅔ cup of cooked cereal.

Calories, 231: protein, 4 grams; carbohydrate, 54 grams.

HOMINY (Samp)

Soak the hominy 5 or 6 hours, and drain. Use 1 quart of boiling water to 1 cup of samp and cook 4 to 6 hours.

Samp is excellent as a vegetable as well as a cereal, and may be used in place of macaroni.

ROLLED OATS

30 grams rolled oats [1]
⅔ cup boiling water
Salt to taste

Cook 15 to 20 minutes. Yields 10 tablespoons or a scant ⅔ cup of cooked cereal.

Calories, 119: protein, 4 grams; fat, 2 grams; carbohydrate, 21 grams.

OATMEAL MUSH FOR CHILDREN AND INVALIDS

1 cup granulated oatmeal
1 scant quart boiling water
1 tsp. salt

Set the boiling salted water over direct flame and stir in the oatmeal slowly with a fork. Boil 10 minutes over direct heat, then set over hot water in a double boiler and cook 3 to 4 hours.

Baked sour apples, applesauce, and apple jelly are delicious with oatmeal. They should be served with the mush and sugar and cream poured over the whole. They give the acid flavor which so many crave in the morning.

Calories, 355: protein, 13 grams; fat, 7 grams; carbohydrate, 60 grams.

BOILED RICE
(Individual rule)

2 tbsp. rice
2 cups boiling water
½ tsp. salt

Wash the rice thoroughly and gradually add to the boiling salted water, taking care that the water does not stop boiling. Boil hard, uncovered, for 15 to 20 minutes, or until the grains of rice are soft. Turn into a strainer to drain, then put in the oven a few moments to dry.

Calories, 70: protein, 2 grams; carbohydrate, 16 grams.

[1] The relation between measure and weight of rolled oats varies. Thirty grams of Quaker Oats equals about 5 tbsp.; Armour's, 8 tbsp.; Kellogg's New Oats, 6 tbsp.

STEAMED RICE

(2 servings)

6 tbsp. rice
2¼ cups boiling water
½ tsp. salt

Wash the rice thoroughly and put it in the upper part of a double boiler with the boiling salted water. Cook without stirring for 1 hour, or until the grains are tender.

Calories, 210: protein, 5 grams; carbohydrate, 48 grams.

SOYA CEREAL

1 cup quick-cooking cracked soybeans
3 cups boiling water
Salt to taste

Cook the cracked soybeans in the boiling salted water for 10 to 15 minutes, stirring occasionally. Serve with milk or cream or butter. Add sugar if desired. This is a low-starch cereal.

Stewed fruit juice instead of water gives the soya cereal a delicious flavor and a natural sweetening. Cook the cracked beans in prune, fig, or raisin juice. Or cook the cereal in water and add ½ cup of chopped raisins or dates 5 minutes before it is done.

Calories, 264: protein, 25 grams; fat, 13 grams; carbohydrate, 12 grams.

FRUITS WITH CEREALS

Fruits served with breakfast cereals make them more appetizing. Use about one-third as much fruit as cereal. Fresh or stewed or preserved fruit is served cold over the cereal. Chopped or dried fruits—figs, raisins, dates, cooked prunes, nuts, or a mixture—should be added to the cereal 5 minutes before it is done. Or lay the fruit on top of the cereal 15 minutes before it is done to steam the fruit.

Cream or milk may be used on the fruit and cereal, but little if any sugar should be added.

GRUELS

Gruels are thin porridges made from finely ground grain products, with either water or milk. They are cooked for a long time until the starch grains are thoroughly ruptured and the starch passes into the colloidal form. It is more easily digested in that form. Therefore the time recommended for cooking should be carefully kept by the clock.

For invalids and young children gruels should be strained through

cheesecloth or a sieve to remove undissolved portions. The smooth product which is left does not irritate weakened digestive organs.

Whole grains such as pearled barley or oat flakes are used in the proportion of 2 to 4 tablespoons to 1 pint of water, depending upon the consistency desired. Flours of grains are used in the same proportions.

ARROWROOT GRUEL

2 tsp. arrowroot
2 tbsp. cold water
1 cup boiling water or milk
Salt to taste

Mix the arrowroot to a smooth paste with the cold water. Add the paste to the boiling milk or water, salted. Cook in a double boiler for 20 minutes. Sugar, lemon juice, or brandy may be added as desired. Arrowroot is the purest form of starch and beneficial in cases of diarrhea if not given too hot.

Calories, with milk, 187: protein, 9 grams; fat, 9 grams; carbohydrate, 17 grams.

BARLEY GRUEL FOR INFANTS

2 tbsp. barley flour
1/4 cup cold water
1 3/4 cups boiling water
Pinch of salt

Mix the flour to a smooth paste with the cold water. Stir the paste into the briskly boiling salted water, stirring constantly. After the mixture has boiled, cook in a double boiler at least 1/2 hour. Strain and dilute with hot water to bring the amount up to 1 pint or to the desired consistency of thin paste or jelly.

For the adult, milk may be substituted for water in this recipe. Sugar may be added if desired.

Calories, 50: protein, 1 gram; carbohydrate, 11 grams.

RICE, WHEAT, AND OAT GRUELS

These gruels are made from rice, wheat, or oat flour exactly as barley gruel above. They may also be made from the grain, using the proportion of 2 tbsp. of grain to 1 quart of water, with 3/4 tsp. of salt. Cook in a double boiler for 2 hours.

BARLEY GRUEL WITH BROTH

(2 servings)

2 cups beef broth
2 tbsp. barley flour
2 tbsp. cold water
1/4 tsp. salt

Have the stock boiling. Make a smooth paste of the barley flour, salt,

and cold water. Add the paste gradually to the boiling stock and boil for ½ hour. Strain and serve very hot.

Calories, 118: protein, 9 grams; fat, 4 grams; carbohydrate, 11 grams.

CORN-MEAL GRUEL

1 tbsp. corn meal	2 tbsp. cold water
½ tbsp. flour	1½ cups boiling water
¼ tsp. salt	Milk or cream

Make a smooth paste of the corn meal, flour, salt, and cold water. Stir the paste into the boiling water and cook in a double boiler 1½ hours. Dilute with hot water, milk, or cream to the desired consistency of thin paste or jelly. This gruel may be strained.

Hot milk may be used instead of boiling water.

Calories without milk or cream, 40: protein, 1 gram; carbohydrate, 9 grams.

CRACKER GRUEL

(Individual rule)

2 tbsp. sifted cracker crumbs	1 cup scalded milk
⅛ tsp. salt	

Put the cracker crumbs in the top of a double boiler. Slowly pour the hot milk, salted, over the crumbs. Cook 5 minutes in the double boiler, or 2 minutes over direct heat.

A convenient way to make the crumbs is to put the crackers through a meat chopper several times, then sift.

Calories, 232: protein, 10 grams; fat, 11 grams; carbohydrate, 23 grams.

FARINA GRUEL

(Individual rule)

½ tbsp. farina	½ cup scalded milk
¼ cup cold water	Salt to taste
½ cup boiling water	

Mix the farina with cold water. Add to the boiling water and boil 30 minutes. Add the scalded milk, taste and season.

A little sugar may be added if desired, or an egg may be beaten and the gruel slowly poured into it.

Calories, 96: protein, 5 grams; fat, 5 grams; carbohydrate, 9 grams.

FLOUR GRUEL, OR THICKENED MILK

(Individual rule)

¾ cup scalded milk
¼ cup cold milk
½ tbsp. flour
1 dozen raisins
Pinch of salt

Scald the milk. Mix the flour with the cold milk to a smooth paste and stir the paste into the scalded milk. Cook in a double boiler 30 minutes.

Stone and quarter the raisins, then add enough water to cover. Cook slowly until the water has all boiled away. Add the raisins to the gruel just before serving. Season with salt.

Calories, 214: protein, 9 grams; fat, 9 grams; carbohydrate, 24 grams.

OATMEAL GRUEL

¼ cup rolled oats
1⅓ cups boiling water
¼ tsp. salt
Milk or cream

Mix the oats, water, and salt in the top of a double boiler. Cook 5 minutes over direct heat, then over hot water for 1 hour. Strain, bring to the boiling point, and add milk or cream as desired.

Sugar and a little port wine may be substituted if allowed and desired, and hot milk may be used instead of water.

Granulated oatmeal may be used instead of rolled oats. In that case, use 1½ cups of boiling water and cook for 4 to 5 hours, adding more water if necessary. Strain and dilute with hot milk to make it the right consistency.

Calories, without milk or cream, 90: protein, 3 grams; fat, 2 grams; carbohydrate, 15 grams.

TAPIOCA GRUEL

1 tbsp. granulated tapioca
1 cup boiling water or milk
Salt to taste

Add the tapioca to the boiling salted water in the top of a double boiler. Cook 15 minutes or longer, replacing the water which boils away. Strain and serve hot.

Sugar, lemon or orange juice, or flavoring may be added as allowed and desired.

Calories, with milk, 219: protein, 9 grams; fat, 9 grams; carbohydrate, 25 grams.

STARCHY JELLIES

Cereal jellies are made like gruels, using twice the amount of cereal, and cook in water instead of milk. When the cereal mixture cools, jelly will form. Serve cold with milk and, if allowed, sugar.

BARLEY JELLY

(3 servings)

3 tbsp. pearled barley
1 quart cold water
1/8 tsp. salt

Soak the barley overnight, drain, and add 1 quart of fresh water. Add the salt and cook in a double boiler for 4 hours. Add water as necessary. When the cooking is finished the gruel should be reduced to 1 pint. Strain through cheesecloth and let cool.

This makes a thick jelly. Two tablespoons dissolved in 8 ounces of warmed and sweetened milk may be given to infants at a single feeding.

Oatmeal, wheat grits, and rice grains may be used the same way.

Calories, 107: protein, 3 grams; carbohydrate, 24 grams.

RICE JELLY

(3 servings)

1 1/2 tbsp. rice
1 cup cold water
2/3 cup milk
Pinch of salt
1 egg white

Wash the rice thoroughly and soak in the cup of cold water for 2 hours. Drain off the water and cook the rice, milk, and salt in a double boiler for 1 1/2 hours. Strain through a fine sieve and cool. When the jelly has begun to set, whip the white of egg and fold into the jelly. Pour into molds and chill. Serve with fruit juice or cream and sugar.

Calories, 177: protein, 10 grams; fat, 6 grams; carbohydrate, 21 grams.

TAPIOCA JELLY

(3 servings)

4 tbsp. pearled tapioca
1 cup cold water
2/3 cup boiling water
Pinch of salt

Soak the tapioca in the cold water for 3 hours. Add to the boiling water and salt in the top of a double boiler. Cook 2 1/4 hours. Serve hot, with cream, wine, and powdered sugar. Or flavor while hot with lemon juice and chill.

Calories, 212: carbohydrate, 53 grams.

STARCHY SAUCES

WHITE SAUCE (Cream Sauce)

White sauce is thin, medium, thick, or very thick according to its use. Use the following ingredients:

	Milk	*Fat*	*Flour*	*Use*
Thin	1 cup	1 tbsp.	1 tbsp.	Cream soups
Medium	1 cup	2 tbsp.	2 tbsp.	Creamed vegetables and sauces
Thick	1 cup	3 tbsp.	3 tbsp.	Gravies, sauces, and soufflés
Very thick	1 cup	4 tbsp.	4 to 5 tbsp.	Binding croquettes

Melt the fat and stir in the flour. Take off the heat and gradually add the hot milk. Put over the heat again and cook over very low heat, stirring constantly, for about 5 minutes, until thick and thoroughly cooked.

For those of weak digestion, the following method of blending the sauce is preferred:

Stir the flour to a smooth paste with a little of the cold liquid. Gradually add the rest of the cold liquid and cook thoroughly in a double boiler. Just before serving add the fat, bit by bit, and then the salt.

White sauce may be varied by different flavors and garnishes—capers, celery, mushrooms, lobster, oysters, etc.

DUTCH SAUCE

Cook 1 cup of white sauce with the beaten yolks of 2 eggs in the top of a double boiler, like custard. Flavor with 1 tablespoon of lemon juice.

MACARONI

Macaroni, spaghetti, and vermicelli are all made of wheat flour and water. The only difference is in the size. All are cooked like macaroni. Select macaroni with a creamy color rather than dead white. Good macaroni breaks evenly with no ragged edges.

BOILED MACARONI
(Individual rule)

¼ cup macaroni
3 cups boiling water
1 tsp. salt
Cream *or* milk

Break the strips of macaroni into 1-inch pieces. Put them in a strainer

and rinse with cold water. Cook in boiling salted water for about 20 minutes, or until tender. Drain and pour a little cold water over the macaroni to keep the pieces from sticking together. Add cream or milk, season with salt, and reheat.

Macaroni may also be served with white sauce or tomato sauce and grated cheese.

Calories without cream or milk, 72: protein, 3 grams; carbohydrate, 15 grams.

TOMATO SAUCE

(Individual rule)

1/3 cup strained tomato juice	1/2 tbsp. flour
1/2 tbsp. butter	Salt and pepper to taste

Scald the tomato juice. Melt the butter, remove from the stove, and add the flour. Mix thoroughly, then gradually pour on the hot tomato, stirring constantly while blending. Cook thoroughly until there is no taste of starch. Season with salt and pepper.

If desired and allowed, the tomato juice may be seasoned with onions, herbs, and spices by cooking them in it for a short time, then straining.

Calories, 83: protein, 2 grams; fat, 6 grams; carbohydrate, 5 grams.

BAKED MACARONI

Fill a buttered baking dish with alternate layers of boiled macaroni, white sauce, and cheese. Cover with buttered cracker crumbs and bake until the crumbs are a golden brown. Tomato sauce may be used instead of white sauce. Or sauce may be omitted entirely and the dish filled with alternate layers of macaroni and cheese. Pour milk over the whole and top with a layer of cheese.

BUTTERED CRUMBS

Melt 1 tablespoon of butter in a saucepan. Remove from the heat and add 1/4 cup of finely rolled cracker crumbs (or bread crumbs). Mix until the crumbs are coated with butter.

32.
DESSERTS

The dessert, properly prepared, may constitute a very large part of the nourishment in a meal. Desserts made with eggs, milk, cream, and starches in large proportion are high in nutritive value and form a useful means of administering these foods to patients who do not like the flavor of plain milk, raw eggs, or cereals.

Combinations of foods for invalids should always be simple, since the more complex the mixture of protein, fat, and carbohydrate, the longer it takes to digest it. For this reason rennet-custard, which is simply flavored coagulated milk, is one of the most easily digested desserts. As a rule sugar is less acceptable in sickness than in health. Too much sugar is likely to cause loss of appetite or nausea.

Like all foods served to patients, desserts should be attractively served. Cold desserts should be thoroughly chilled; hot ones be hot. A lukewarm one is never appetizing. Never pour sauces over desserts until the last moment before serving.

CUSTARDS

Custards are nutritious and easily digested, an excellent food for invalids. They are made of milk, eggs, and sugar, with salt and a flavoring added. Soft custard is a little more delicate than baked custard.

Rennet-custard, made without eggs or cooking, is the most delicate and easily digested.

BAKED CUSTARDS

Baked custards should be baked in individual molds and served in the molds to keep them from breaking and growing watery. Bake custards in a moderate oven (375° F.), with the molds set in a pan containing hot water. Too much heat, or overcooking, will ruin custard. The water in the pan should never boil. When the custard is done, remove from the hot water and cool quickly.

BAKED CUSTARD I

(Individual rule)

1 cup milk	1½ tbsp. sugar
1 egg	⅛ tsp. salt

Flavoring to taste—nutmeg, cinnamon, vanilla or lemon extract.

Scald the milk. Beat the egg, add the sugar and salt, and gradually pour on the scalded milk. Flavor to taste and pour into buttered custard cups, place in a deep pan, and pour hot water around until it almost reaches the top of the cups. Bake in a moderate oven 20 to 30 minutes. If cinnamon is used for flavor, put one-half or an inch square into the milk when scalding.

To test when done, dip a pointed knife into the water and plunge it into the middle of the custard. If it looks set and the knife comes out clean, the custard is done; if milky, it is not cooked enough. If cooked too long, the custard will curdle.

Calories, 335: protein, 15 grams; fat, 15 grams; carbohydrate, 35 grams.

BAKED CUSTARD II

(Individual rule)

⅔ cup milk	½ tsp. salt
1 egg	Nutmeg
1½ tbsp. sugar	¼ tsp. vanilla

Blend as for Baked Custard I. The smaller quantity of milk makes a little firmer custard.

Calories, 280: protein, 12 grams; fat, 12 grams; carbohydrate, 31 grams.

CARAMEL CUSTARD

(Individual rule)

⅔ cup milk	Few drops vanilla
3 tbsp. sugar	Pinch of salt
1 egg, slightly beaten	

Scald the milk. Put 2 tablespoons of sugar into a small saucepan, place over heat, and stir constantly until the sugar is melted and a light brown color. Add the milk and pour over the slightly beaten egg. Add the remaining tablespoon of sugar and the flavoring. Strain into buttered custard cups, place in a pan of hot water, and bake until firm in a moderate oven 20 to 30 minutes.

Calories, 340: protein, 12 grams; fat, 12 grams; carbohydrate, 46 grams.

CHOCOLATE CUSTARD

(Individual rule)

2 tsp. chocolate
½ cup milk
2 egg yolks, well beaten
2 tsp. sugar
Pinch of salt

Grate chocolate and mix with 2 tablespoons of the milk. Stir over fire until smooth. Add the remaining milk, the well-beaten egg yolks, sugar, and salt. Pour into buttered custard cups set in a pan of hot water and bake in a moderate oven 20 to 30 minutes.

Calories, 258: protein, 10 grams; fat, 17 grams; carbohydrate, 16 grams.

LACTOSE CUSTARD (Coleman)

1⅓ oz. milk sugar
(about 2⅔ tbsp.)
6 oz. milk (12 tbsp.)
1 egg, slightly beaten
Nutmeg or vanilla
Pinch of salt

Warm the sugar and milk, stirring constantly. Add to the slightly beaten eggs, strain into a custard cup, and flavor. Bake in a pan of water in a moderate oven until a knife when cut into it will come out clean—30 minutes to 1 hour.

Calories, 355: protein, 13 grams; fat, 13 grams; carbohydrate, 47 grams.

MALTED MILK CUSTARD

(Individual rule)

1 tbsp. malted milk powder
½ cup hot water
1 egg yolk, well beaten
Salt

Mix the malted milk powder with enough of the hot water to make a smooth paste. Add the remainder of the water and pour it gradually over the well-beaten yolk. Butter a custard cup, pour in the mixture, and set it in a pan of hot water. Bake in a moderate oven until the custard is set—20 to 30 minutes.

Calories, 95: protein, 4 grams; fat, 6 grams; carbohydrate, 6 grams.

WHITE CUSTARD

1 egg white
1 tbsp. sugar
¼ saltspoon salt
½ cup rich milk
Vanilla, orange, or lemon extract

Whip white of egg until very light. Add the sugar and salt and gradually pour on the milk and flavor. Set the cups in pan of hot water and bake in

a moderate oven 20 to 30 minutes. When firm, set on ice and serve cold. This may be taken by a patient when the yolk of egg is prohibited.

Calories,[1] 198: protein, 7 grams; fat, 10 grams; carbohydrate, 21 grams.

SOFT CUSTARDS

Soft custards, sometimes called boiled custards, are cooked in the top of a double boiler. The water in the bottom part should not be allowed to boil, or the custard will curdle. When the custard is thick and creamy and coats a metal spoon put into it, take it off the hot water immediately and cool. If allowed to stand over hot water, it will overcook and curdle. If a custard does curdle, beating with a rotary egg beater will partially repair the damage; but the custard will be thinner.

SOFT CUSTARD I

(Individual rule)

½ cup milk	1 tbsp. sugar
Yolk of 1 egg	Pinch of salt

Scald the milk in the top of a double boiler. Beat the egg yolk, add the sugar and salt, and gradually pour on the scalded milk. Pour back into the top of the double boiler and stir constantly until it thickens and coats a metal spoon and the foam has disappeared. This will take about 5 minutes. Then remove immediately from hot water. Cool and flavor with vanilla, orange, or lemon extract as desired.

If custard curdles, place saucepan over cold water and beat until smooth.

This custard is usually used for pudding sauces.

Calories, 200: protein, 7 grams; fat, 10 grams; carbohydrate, 21 grams.

SOFT CUSTARD II

(2 servings)

1 cup milk	⅛ tsp. salt
2 eggs	¼ tsp. vanilla or grating of nutmeg
2 tbsp. sugar	

Reserve 1 egg white for meringue. Blend as for Soft Custard I. This custard is usually used as a foundation for puddings.

Calories, 444: protein, 21 grams; fat, 21 grams; carbohydrate, 43 grams.

[1] Calculated with 6 tbsp. whole milk, 2 tbsp. thin cream.

MERINGUE

1 egg white
Pinch of salt
2 tbsp. powdered sugar
Lemon or orange juice

Whip the egg white until stiff and dry. Add the salt, sugar, and lemon juice to taste. Beat very little after adding the sugar.

Calories, 109: protein, 3 grams; carbohydrate, 24 grams.

ALMOND PUDDING

Line a glass dish with slices of stale cake and put in some salted almonds Pour a little sherry wine on the cake. Chill Soft Custard II and pour over it. Cover with meringue containing some salted almonds.

BANANA CUSTARD

Peel bananas and slice very thin with a silver knife. Put into serving dish and flavor with lemon juice. Chill Soft Custard II, pour over fruit, and cover with meringue.

FLOATING ISLAND

Chill Soft Custard II, pour into a serving dish, and cover with meringue.

LACTOSE SOFT CUSTARD (Coleman)

8 oz. milk (1 cup)
1 egg
2 oz. milk sugar (6 tbsp.)
Speck of salt
2 to 3 drops vanilla or caramel made of 3 tbsp. of granulated sugar

Blend as for Soft Custard I. To make caramel, place the 3 tablespoons of sugar in a heavy skillet directly over the heat, and melt it. When entirely melted and a deep brown color, add 3 tablespoons of boiling water and cook until all is dissolved.

Calories without caramel, 473: protein, 15 grams; fat, 15 grams; carbohydrate, 69 grams.

ORANGE CUSTARD

Peel, slice, and seed oranges and place in a serving dish. Chill Soft Custard II, pour over fruit, and cover with meringue.

RENNET-CUSTARDS

Rennet-custards are thickened not with eggs, but with the active principle of rennet found in rennet tablets. Rennet powder, which comes sweetened and flavored, may be used instead.

Milk or cream which has been boiled, sterilized, condensed, or evaporated cannot be used in making rennet-custards. Take care to heat the milk only *lukewarm*. Hot milk prevents the action of the rennet.

PLAIN RENNET-CUSTARD

(2 servings)

- 1 cup milk
- 2 tbsp. sugar
- ½ tbsp. brandy *or* wine
- 1 tsp. cold water
- ½ rennet tablet *or*
- ¼ tsp. rennet extract *or*
- 1 tsp. essence of pepsin

Heat the milk until lukewarm. Add the sugar and flavoring, and when the sugar is dissolved add the rennet tablet dissolved in the cold water. Pour the mixture immediately into sherbet cups or champagne glasses, filling partly full. Place in warm room undisturbed until firm like jelly, then put in the refrigerator. Serve with whipped cream heaped on top, with ½ teaspoon of bright jelly for garnish.

For variety, whole strawberries or raspberries may be served with rennet-custard, or chopped English walnuts with the whipped cream. For garnish, candied cherries may be used.

If desired, the brandy and sugar may be omitted, serving plain with sugar and a grating of nutmeg.

Calories, 286: protein, 8 grams; fat, 9 grams; carbohydrate, 42 grams.

RENNET-CUSTARD WITH EGGS

(5 servings)

- 1 rennet tablet
- 1 tbsp. cold water
- 2 egg yolks
- 3 tbsp. sugar
- Small pinch salt
- 1 pint milk
- ½ tsp. vanilla flavoring

Dissolve rennet tablet in the cold water. Beat the egg yolk slightly and add with the sugar, salt, and vanilla to the milk. Warm to lukewarm—not hot—stirring constantly. Add the dissolved rennet tablet. Stir quickly a few seconds and pour into dessert glasses. Allow to set until firm, then chill in the refrigerator.

Calories, 626: protein, 22 grams; fat, 29 grams; carbohydrate, 69 grams.

MAPLE RENNET-CUSTARD WITH PUFFED RICE

(4 servings)

1 pkg. maple rennet dessert powder	½ cup puffed rice
1 tbsp. sugar	1 egg
	1 pint milk

Put the milk in the top of a double boiler. Beat the yolk of the egg until light and add to the milk. Heat to lukewarm, dissolve in it the rennet dessert powder, and turn at once into glasses. Allow to set until firm. Chill. Before serving, crisp the puffed rice in the oven. Beat the egg white with the sugar until stiff. Chill. Use as a meringue.

Calories,[2] 507: protein, 24 grams; fat, 25 grams; carbohydrate, 47 grams.

PLAIN AND COCOA RENNET-CUSTARD WITH LACTOSE (Coleman)

(2 servings)

1 tsp. cocoa	5 oz. milk (10 tbsp.)
25 grams milk sugar (scant 3 tbsp.)	½ rennet tablet, dissolved in 1 tbsp. water

Mix the cocoa and sugar, add the milk, and heat lukewarm, stirring constantly. Add the dissolved rennet tablet, stir thoroughly, and leave in a cool place to set. For plain rennet-custard, omit cocoa.

Calories, 211: protein, 6 grams; fat, 6 grams; carbohydrate, 33 grams.

FROZEN DESSERTS

Frozen desserts not only provide nutriment, but also furnish additional liquid and relieve thirst. Water ices and sherbets have a dietetic value similar to acid beverages. Frozen cream, milk, rennet-custards, custards, and so forth have the same nutritive value as the same foods served without freezing.

In giving frozen foods, take care not to interfere with the digestion of other foods. Chilling the mouth hinders the formation and activity of saliva; chilling the stomach retards gastric digestion. Chilling the stomach can be avoided by eating frozen food very slowly so that it is partially warmed by the time it reaches the stomach. When ptyalin digestion is especially important, no frozen foods should be given.

Directions for freezing Ice (or snow) and salt are required for

[2] Calculated without rennet powder.

the process of freezing. The salt makes the ice melt faster; and in melting the ice absorbs heat from the mixture in the ice-cream container, thus causing the ice cream to freeze.

Scald the container and dasher of the freezer and prepare the mixture to be frozen. Crush the ice—the finer the ice the faster the freezing process. For a fine-grained mixture use 5 parts of ice to 1 part of rock salt or ice-cream salt. Three parts to 1 is allowable, but the ice cream will be coarser.

Pack ice around the container about two-thirds of the way, then use alternate layers of salt and ice until the bucket is full. The container should be filled only half to two-thirds full of cream because it expands when it freezes. Turn the crank slowly until it begins to turn hard, then turn faster. Add more ice and salt as necessary.

When the ice cream is frozen, wipe off the lid of the container and tip the water out of the bucket. Scrape the cream from the dasher and pack the cream firmly in the container. Plug the hole in the top of the container and repack in ice and salt and leave to ripen. Ice cream should ripen at least an hour.

Freezing in a refrigerator Set the control of the refrigerator for fast freezing. Pour the ice-cream mixture into a freezing tray and freeze until firm. Remove from the tray to a chilled bowl and break up with a wooden spoon. Beat with an egg beater until the mixture is free from lumps but not yet liquid. If egg whites or whipped cream are to be added, fold them in at this point. Return the mixture to the freezing tray and freeze again.

Freezing in small amount Put the mixture to be frozen into a watertight baking-powder can or a small tin pail with a cover and stand it in a large pail or bowl. Pack the ice and salt alternately under and around it, using 3 parts ice to 1 part salt. Remove the cover and beat the mixture with a rotary egg beater until foamy. Put the cover on again and turn the can back and forth. Remove the cover occasionally, scrape the mixture down from the sides of the can, and beat thoroughly with a fork. The mixture will freeze in 20 minutes. When it is frozen, dip a narrow strip of cloth in melted beef fat or lard and wrap it around the outside of the cover to keep out the salt water. Repack in ice and salt and cover well until ready to use.

ICE CREAMS

CARAMEL ICE CREAM I

(Individual rule)

2 tbsp. sugar
1¼ tbsp. boiling water
⅓ tsp. vanilla
Pinch of salt
½ cup thin cream

Place the sugar in a heavy skillet and stir constantly until melted. Add the water and boil until reduced to 1½ tablespoons. Add cream very slowly, vanilla, salt, and freeze.

Calories, 370: protein, 4 grams; fat, 24 grams; carbohydrate, 35 grams.

CARAMEL ICE CREAM II

(10 servings)

1 pint milk
1 cup sugar
2 tbsp. flour
Pinch of salt
2 eggs
1 quart thin cream
1 scant cup sugar for caramel

Scald the milk. Mix 1 cup of sugar, the flour, and salt. Add the egg, and beat all together until perfectly smooth and light. Add the scalded milk gradually, beating until very smooth. Cook in the top of a double boiler 20 minutes.

While cooking, prepare the caramel. Put the second cup of sugar in a heavy skillet and cook until melted and a delicate brown. Add the custard gradually, stirring constantly. Strain and cool. Add the cream, which has been scalded and cooled, and freeze in a large freezer.

This may be used for vanilla ice cream by omitting the caramel and using 1 tablespoon of vanilla and enough of the second cup of sugar to sweeten.

Calories, 3910: protein, 59 grams; fat, 223 grams; carbohydrate, 417 grams.

CHOCOLATE ICE CREAM

(Individual rule)

¼ square chocolate
1 tbsp. boiling water
1½ tbsp. sugar
½ cup thin cream
¼ tsp. vanilla
Pinch of salt

Melt the chocolate over hot water. Add the boiling water, sugar, and hot cream. Cool, add vanilla and salt, and freeze in a small pail according to general directions.

Calories, 383: protein, 4 grams; fat, 28 grams; carbohydrate, 29 grams.

COFFEE ICE CREAM

(Individual rule)

1 tbsp. ground coffee
¼ cup milk
1½ tbsp. sugar
Pinch of salt
½ cup thin cream

Mix the coffee and milk in the top of a double boiler and cook 5 minutes. Strain through cheesecloth and strainer, add sugar, salt, and cream. Cool and freeze in small pail according to directions for freezing in small amounts.

Calories, 381: protein, 6 grams; fat, 27 grams; carbohydrate, 30 grams.

FROZEN CUSTARD

(2 servings)

1 egg
Pinch of salt
2 tbsp. sugar
¼ teaspoon vanilla
1 cup scalded milk

Beat the egg, add the salt and sugar, and gradually the scalded milk. Cool, add flavoring, and freeze.

Calories, 365: protein, 15 grams; fat, 15 grams; carbohydrate, 42 grams.

GRAPE-JUICE ICE CREAM

(Individual rule)

½ cup thin cream
¼ cup sugar
¼ cup grape juice

Scald half of the cream and add the sugar. Cool, add the remainder of cream and the grape juice, and freeze.

Calories, 500: protein, 4 grams; fat, 24 grams; carbohydrate, 67 grams.

MALTED-MILK ICE CREAM

(10 servings)

½ pound malted milk powder
1 cup granulated sugar
1 quart boiling water
1 pint thick cream
2 oz. chocolate
1 tbsp. vanilla
White of 1 egg

Mix the malted milk powder, sugar, and boiling water, stirring until smooth. Add the cream and scraped chocolate and cook until the chocolate is melted. Add vanilla, cool, and freeze. When partly frozen, add the well-beaten white of egg and finish freezing.

Strawberry or other flavor may be used in place of vanilla.

Calories, 3976: protein, 51 grams; fat, 243 grams; carbohydrate, 397 grams.

PEACH ICE CREAM

(Individual rule)

¼ cup peaches
½ cup thin cream
2 tbsp. sugar

Mix the peaches and sugar and press through a potato ricer or sieve. Scald the cream. Cool, add peaches and sugar, and freeze in a small pail according to general directions.

Calories, 404: protein, 4 grams; fat, 24 grams; carbohydrate, 43 grams.

RASPBERRY ICE CREAM

(Individual rule)

¼ cup raspberries
½ cup thin cream
2 tbsp. sugar
Pinch of salt

Mash the raspberries and strain through cheesecloth. Add the cream and sugar. Freeze in small pail according to general directions.

Calories, 404: protein, 4 grams; fat, 24 grams; carbohydrate, 43 grams.

REFRIGERATOR ICE CREAM [3]

(1½ pints)

2 tsp. gelatin
¼ cup cold water
½ cup sugar
Dash of salt
1½ cups milk
Flavoring
1 cup heavy cream, whipped

Soak the gelatin in the cold water 5 minutes. Add the sugar and salt to the milk and stir until dissolved. Dissolve the gelatin over hot water, add, mix well, and let stand until the mixture is of the consistency of a White Sauce. Add the flavoring and fold in the whipped cream. Freeze in a tray 3 to 4 hours, stirring twice during the first hour. This is easily made, and not very rich.

Calories, 1600: protein, 22 grams; fat, 110 grams; carbohydrate, 130 grams.

[3] From *Everybody's Cookbook*, edited by Isabel Ely Lord, New York: Harcourt, Brace and Co., 1937. Reprinted by permission.

RENNET-CUSTARD ICE CREAM[4]

(6 servings)

1 cup thick cream
1 quart rich milk
1 cup sugar
2 rennet tablets dissolved in
1 tbsp. cold water
½ tbsp. vanilla

Heat the cream, milk, and sugar to lukewarm. Add the dissolved rennet tablets and the vanilla. Allow to jelly in warm place and then freeze.

This is especially valuable because of its digestibility.

Calories,[5] 2421: protein, 39 grams; fat, 134 grams; carbohydrate, 265 grams.

STRAWBERRY ICE CREAM

(Individual rule)

¼ cup strawberries
2 tbsp. sugar
½ cup thin cream
Pinch of salt

Mash the strawberries with the sugar and allow them to stand 5 minutes. Add the cream and freeze in a small pail according to general directions.

The berries may be mashed and strained through cheesecloth.

Calories, 390: protein, 4 grams; fat, 24 grams; carbohydrate, 39 grams.

VANILLA ICE CREAM

(Individual rule)

½ cup thin cream
1½ tbsp. sugar
½ tsp. vanilla
Pinch of salt

Blend all the ingredients. When the sugar is dissolved, freeze in a small pail.

Calories, 340: protein, 4 grams; fat, 24 grams; carbohydrate, 27 grams.

VANILLA ICE CREAM WITH LACTOSE (Coleman)

(Individual rule)

4 oz. cream (½ cup)
2 oz. milk (4 tbsp.)
2 oz. milk sugar (about 6 tbsp.)
Pinch of salt
Few drops of vanilla

Mix the cream, milk, and sugar and heat, stirring constantly, until the sugar is dissolved. Then flavor, cool, and freeze.

Calories, 531: protein, 6 grams; fat, 26 grams; carbohydrate, 68 grams.

[4] The new prepared rennet mix for making ice cream is a simple way of making this ice cream.

[5] Calculated with whole milk.

ICES

CLAM FRAPPÉ

(Individual rule)

¾ cup cold water
¼ cup clam broth
Speck of paprika

Blend and freeze to the consistency of mush. Serve in small punch glasses or champagne glasses, with a teaspoon of unsweetened whipped cream on top. Delicious to serve for dinner in place of shellfish.

FRUIT ICE

(Individual rule)

½ banana
⅓ cup strawberries
½ cup cold water
½ cup sugar
Juice of ½ orange
Juice of ½ lemon

Put the bananas and strawberries into a coarse strainer or a potato ricer and rub them through into a large bowl. Pour the cold water through the strainer. Add the sugar and juices, stir well, and freeze.

Calories, 517: protein, 1 gram; fat, 1 gram: carbohydrate, 127 grams.

GRAPE FRAPPÉ

(6 servings)

1 pint water
2 cups sugar
1 pint grape juice
Juice of 1 lemon

Boil the water and sugar together for 5 minutes, then cool and add the grape and lemon juice. Freeze to the consistency of mush and serve in tall glasses with sweetened whipped cream piled high on top.

Calories, 1832: protein, 1 gram; carbohydrate, 457 grams.

LEMON ICE

(Individual rule)

½ cup water
4 tbsp. sugar
Juice of 1 lemon

Mix all ingredients and freeze in small pail.

Calories, 240: carbohydrate, 60 grams.

ORANGE ICE I

(Individual rule)

½ cup water	1 tbsp. lemon juice
¼ cup sugar	Juice of 1½ oranges

Mix together all the ingredients and freeze in small pail.
Calories, 270: protein, 1 gram; carbohydrate, 67 grams.

ORANGE ICE II

(4 servings)

2 tbsp. granulated gelatin	1 cup sugar
½ cup cold water	1 cup orange juice
1½ cups boiling water	Juice of 1 lemon

Soak gelatin in the cold water 20 minutes. Add the boiling water and when gelatin is dissolved add the sugar and the juices. Cool, strain, and freeze.
Calories, 998: protein, 11 grams; carbohydrate, 238 grams.

PINEAPPLE ICE

(Individual rule)

½ cup water	⅓ cup grated pineapple
2 tbsp. sugar	1 tbsp. lemon juice

Boil the water and sugar together for 3 minutes. Cool and add the pineapple and lemon juice. Cool, strain, and freeze in a small pail.
Calories, 174: carbohydrate, 43 grams.

SALPICON OF FRUIT

A delicious salpicon is made by cutting all kinds of fresh fruits into small pieces and flavoring with wine or lemon juice and sugar. Put into serving dish with orange or lemon ice on top. Serve individually in champagne glasses on a small plate with a doily, with a few orange straws or a single rose or other flower to correspond with color of the ice.

SHERBET

APRICOT CHIFFON SHERBET [6]

(1 quart)

3 eggs, beaten separately
3 tbsp. water
1 cup apricot pulp
3 tbsp. lemon juice
¾ cup sugar

Add to the slightly beaten egg yolks the water and apricot (fresh, canned or cooked dried) and cook in a double boiler, stirring until thick. Let cool. Add the sugar to the stiff whites and cut and fold this into the apricot mixture. Freeze in a tray 4 to 5 hr., stirring once.

Calories, 1165: protein, 23 grams; fat, 18 grams; carbohydrate, 228 grams.

CLAM SHERBET

(Individual rule)

¾ cup milk
¼ cup clam broth
Pinch of paprika

Blend and freeze. Serve in small cocktail glasses with a teaspoon of unsweetened whipped cream on top. The milk and clam taken in this way are often more acceptable to the patient than when served in liquid form.

Calories, 125: protein, 6 grams; fat, 7 grams; carbohydrate, 9 grams.

GRAPE AMBROSIA

(12 servings)

1 quart milk
2 quarts water
3½ cups sugar
1 pint grape juice
1 can grated pineapple
Juice of 3 lemons
Whites of 4 eggs

Mix together the milk, water, sugar, and fruit and freeze partially. Add the stiffly beaten whites of eggs and continue freezing until hard.

Calories, 4324: protein, 50 grams; fat, 38 grams; carbohydrate, 945 grams.

[6] From *Everybody's Cookbook*, edited by Isabel Ely Lord, New York: Harcourt, Brace and Co., 1937. Reprinted by permission.

GRAPE SHERBET

(10 servings)

3 cups grape juice
1 quart water
3 cups sugar
Whites of 2 eggs
2 tbsp. powdered sugar

Blend the grape juice, water, and sugar. Freeze partially. Whip the whites of eggs with the powdered sugar until stiff. Add to the sherbet and continue freezing until hard.

Calories, 3122: protein, 9 grams; carbohydrate, 771 grams.

LEMON MILK SHERBET I

(Individual rule)

½ cup milk
3 tbsp. sugar
1 drop lemon extract
Juice of ¼ lemon

Blend all the ingredients and freeze.

Calories, 263: protein, 4 grams; fat, 5 grams; carbohydrate, 51 grams.

LEMON MILK SHERBET II

(10 servings)

2 tsp. gelatin
2 tbsp. cold water
2 cups sugar
½ cup boiling water
Few grains salt
Grated rind of 1 lemon
Juice of 3 lemons
1 quart milk
½ pint cream, 20%
2 egg whites, stiffly beaten

Soak the gelatin in the cold water. Bring the sugar, salt, and water to the boiling point. Add the soaked gelatin. Stir and strain. Add the lemon rind and juice. Cool and add to the milk and cream. When the mixture begins to set, beat with an egg beater until light and fluffy. Fold in the stiffly beaten egg whites and serve with soft custard made from egg yolks.

Calories, 2857: protein, 44 grams; fat, 86 grams; carbohydrate, 477 grams.

MALTED MILK SHERBET

(6 servings)

½ pound malted milk powder
3 pints water
1 cup granulated sugar
1 tbsp. vanilla
2 oz. chocolate, grated
White of 1 egg, stiffly beaten

Make a smooth paste of the malted milk powder and a little of the water, then add the rest of the water gradually, the sugar, the vanilla, and the

chocolate. Freeze. When partly frozen, add the stiffly beaten white of egg and finish freezing.

Calories, 2142: protein, 39 grams; fat, 51 grams; carbohydrate, 381 grams.

STRAWBERRY SHERBET I

(Individual rule)

1 cup strawberries
½ cup milk
¼ cup sugar

Mash the berries and strain. Add milk and sugar to the juice and freeze in a small pail.

Calories, 375: protein, 6 grams; fat, 6 grams; carbohydrate, 75 grams.

STRAWBERRY SHERBET II

(8 servings)

2 quarts strawberries
1 quart milk
2 cups sugar

Mash the berries and strain. Add milk and sugar and freeze.

Calories, 3000; protein, 46 grams; fat, 47 grams; carbohydrate, 598 grams.

PINEAPPLE TOMATO SHERBET [7]

2 tsp. gelatin
¼ cup cold water
2 egg whites, beaten
⅔ cup hot strained tomato juice
2 cups pineapple juice

Soak gelatin in the cold water 5 min., dissolve in the hot tomato juice. Add pineapple juice and chill. Freeze in the freezing tray to a mush (about 1¼ hrs.), remove to a chilled bowl, beat well, cut and fold in stiff egg white. Return to tray to freeze about 1 hr. Do not allow to stand in the tray long after the consistency is right, as it will harden. This is a very refreshing appetizer, which may be made into a dessert sherbet by adding about ¼ cup sugar. Makes 1 quart.

Calories, 347: protein, 13 grams; fat, 1 gram; carbohydrate, 72 grams.

[7] *Ibid.*, reprinted by permission.

GELATIN DESSERTS

Gelatin is a protein derived from collagen, the chief constituent of connective tissue with its various modifications, such as tendons, the chondrigen of cartilage, or the ossein of bone. Although it is a true protein, gelatin alone cannot support life because it lacks the amino acid tryptophane. Gelatin is very easily digested in the stomach and is readily absorbed from the small intestines.

Gelatin dishes, or jellies, supply nutriment in varying degrees according to the ingredients used in them. Orange, lemon, and other acid jellies supply little nourishment. They are used as a pleasant supplement to the ordinary diet in convalescence. Jellies made with eggs and milk—snow pudding, charlottes, Spanish and Bavarian creams—are attractive forms of invalid diet and also supply nutriment.

Rules for using Gelatin will not dissolve in cold water, but it is soaked in cold water to soften it before adding hot liquid to dissolve it. Gelatin should be covered while it is soaking.

Softened gelatin may be dissolved over hot water and the liquid added cold when fruit juices are used. This is particularly good when lemon, orange, and pineapple juices are used in order to preserve their vitamin C content.

For general use, allow 1 tablespoon of gelatin for 2 cups of liquid. If acid fruit juices are used, however, 1 tablespoon of gelatin to 1¾ cups of liquid is a better proportion.

Serving gelatin desserts Gelatin desserts are served in glasses in which they were molded, or they may be hardened in a mold and turned out on a plate. They may be served clear or as riced jellies, whipped jellies, or sponge jellies.

Riced jellies: Chill the jelly until firm, then force it through a potato ricer. Then pile in dessert glasses and garnish with whipped cream.

Whipped jellies: When the jelly is partly set but not firm, whip with a rotary egg beater until very light, then mold and chill.

Sponge jellies: When the jelly is partly set but not firm, fold into it the stiffly beaten whites of eggs, 3 eggs to 2 cups of jelly. Beat until the mixture will hold its shape, mold, and chill.

To unmold jellies Loosen the jelly around the top edge, then dip the mold into a pan of warm water until the water comes up on the mold to the top of the jelly. Remove quickly and shake the mold.

Then put the dish on which the jelly will be served on top of the mold. Turn upside down, holding the dish tight to the top of the mold. Shake gently. If the jelly does not unmold, repeat the process.

BAVARIAN CREAM

(Individual rule)

1 tsp. granulated gelatin
1 tbsp. cold water
¼ cup milk
½ tbsp. sugar
Yolk of 1 egg, beaten
¼ tsp. vanilla
¼ cup whipped cream (2 tbsp. thick cream)

Soak gelatin in cold water 5 minutes. Heat the milk with the sugar in it, and pour it into the beaten yolk of egg. Add this mixture to gelatin, stirring until gelatin is dissolved. Flavor and set in ice water to cool, beating almost constantly. When it begins to stiffen, fold in the whipped cream and pour into cold, wet molds. Serve with whipped cream.

For chocolate Bavarian cream omit vanilla and add chocolate to hot milk, and dissolve before adding to the yolk.

Calories, 250: protein, 7 grams; fat, 20 grams; carbohydrate, 11 grams.

COFFEE JELLY

(2 servings)

1 tsp. granulated gelatin
1 tbsp. cold water
2 tbsp. strong hot coffee
2 tbsp. sugar
7 tbsp. thick cream

Soak the gelatin in the cold water 5 minutes, then add the hot coffee and dissolve. Add the sugar, strain, and set the bowl in chopped ice or ice water to cool, stirring occasionally until it thickens. Then add the cream and pour into cold, wet molds and chill.

Calories, 530: protein, 4 grams; fat, 42 grams; carbohydrate, 34 grams.

COFFEE SPANISH CREAM

(2 servings)

Dissolve ½ teaspoon of gelatin in 5 tablespoons of coffee. Pour this on the beaten yolk of 1 egg. Add ¼ cup of cream and ¼ cup of milk and sweeten to taste. Prepare as a soft custard. When cool add to beaten white of egg. Pour into cold, wet molds and chill.

Calories,[8] 346: protein, 10 grams; fat, 32 grams; carbohydrate, 55 grams.

[8] Calculated with 40% cream and no sugar.

CREAM JELLY

(Individual rule)

1 tsp. granulated gelatin
1 tbsp. cold water
3 tbsp. scalded milk
1 tbsp. sugar
Pinch of salt
4 tbsp. thick cream
Vanilla to taste

Soak the gelatin in the cold water 5 minutes, then add the scalded mill and dissolve. Add the sugar, salt, cream, and vanilla. Stir occasionally unti the mixture thickens, pour into cold, wet after-dinner coffee cups or eg cups, and chill. Serve with soft custard or cream and sugar.

Calories, 359: protein, 6 grams; fat, 28 grams; carbohydrate, 21 grams.

DATE JELLY

½ pound dates
½ pint strawberry gelatin jelly
½ pint orange gelatin jelly

Pit the dates and fill with walnuts chopped fine. Pour half the strawberr mixture into a mold and when it begins to harden cover with layer of dat and half the orange mixture. When this hardens repeat the process until a the ingredients are used. Keep on ice until perfectly firm. Serve with crear

GRAPE FLUFF

(6 servings)

1 tbsp. granulated gelatin
¼ cup cold water
¾ cup sugar
1 cup grape juice
Juice of 1 lemon
Whites of 3 eggs, well beaten

Soften the gelatin in the cold water and dissolve by standing the di in hot water. Dissolve the sugar in the fruit juice and strain the gelat into it. Set in ice water and stir occasionally until the mixture begins thicken, then gradually add the well-beaten whites of eggs and beat un the whole is very light and stiff enough to hold its shape. Pile lightly a glass serving dish or mold and serve with whipped cream or soft custa

Calories, 850: protein, 15 grams; carbohydrate, 197 grams.

GRAPE JELLY

(2 servings)

1 tbsp. granulated gelatin
¼ cup cold water
1 cup boiling water
½ cup sugar
½ cup grape juice
Juice of 1 lemon

Soak the gelatin in the cold water 5 minutes, then add boiling water a

dissolve. Add the sugar, grape juice, lemon juice. Strain, pour into cold, wet molds and cool.

Calories, 521: protein, 5 grams; carbohydrate, 125 grams.

IRISH MOSS JELLY

(3 servings)

½ cup Irish moss
2 cups boiling water
4 figs
Juice of 1 lemon or orange
⅓ cup sugar

Soak, pick over, and wash the moss. Put it into the boiling water, add the figs cut into strips, and *simmer* about 20 minutes, or until it is very thick when dropped on a cold plate. Add lemon juice and sugar. Strain into a cold, wet mold and chill.

Calories, 520: protein, 3 grams; fat, 1 gram; carbohydrate, 125 grams.

LACTOSE JELLY (Carter)

(Individual rule)

½ tsp. granulated gelatin
2 tsp. cold water
3 tbsp. lactose
3 tbsp. boiling water
3 tbsp. orange juice
1 tsp lemon juice
1½ tsp. cane sugar
1 tsp. sherry

Soak the gelatin in the cold water for 5 minutes.

Boil the lactose in water until clear. Pour over soaked gelatin to dissolve and add other ingredients. Strain through cheesecloth and chill.

May also be flavored with grape or raspberry juice.

Calories, 182: protein, 1 gram; carbohydrate, 45 grams.

LEMON JELLY

(Individual rule)

1 tsp. granulated gelatin
1 tbsp. cold water
¼ cup boiling water
2 tbsp. sugar
1 tbsp. lemon juice

Soak the gelatin in the cold water 5 minutes, then add the boiling water and sugar. When the sugar is dissolved, cool and add lemon juice. Pour into cold, wet molds and chill.

Calories, 127: protein, 2 grams; carbohydrate, 30 grams.

JELLIED PRUNES

(6 servings)

1/3 pound prunes	1 cup sugar
2 1/2 cups cold water	1/4 cup lemon juice
2 tbsp. granulated gelatin	

Pick over, wash, and soak prunes for several hours in 2 cups of the cold water and cook in the same water until soft. Remove the prunes, stone, and cut in quarters. To the prune water add enough boiling water to make 2 cups. Soak the gelatin in the half cup of cold water, dissolve in hot liquid, add sugar and lemon juice, then strain, add prunes, mold, and chill. Stir twice while cooling to prevent prunes from settling. Serve with sugar and cream.

Calories, 1332: protein, 14 grams; fat, 1 gram; carbohydrate, 317 grams.

ORANGE CHARLOTTE

(Individual rule)

2 tsp. granulated gelatin	3 tbsp. orange juice
1 tbsp. cold water	1 tbsp. lemon juice
1/3 cup boiling water	Whites of 2 eggs
1/3 cup sugar	Grated rind of 1/2 orange

Soak the gelatin in cold water for 5 minutes. Add the boiling water and sugar and dissolve. Cool and add the fruit juice and orange rind. Allow to set. When jelly is quite thick, but not set, fold in the stiffly beaten whites of eggs. Mix well and pour into cold, wet molds. Chill. Serve with Soft Custard I.

Line the molds with lady fingers or slices of sponge cake and pour in the charlotte. Grated orange rind may be omitted.

Calories, 344: protein, 10 grams; carbohydrate, 76 grams.

ORANGE JELLY I

(6 servings)

2 tbsp. granulated gelatin	1 cup sugar
1/2 cup cold water	1 cup orange juice
2 cups boiling water	Juice of 1 lemon

Soak the gelatin in the cold water 5 minutes, then add the boiling water and dissolve. Add the sugar and cool. Add the fruit juice, strain through a cloth and strainer into cold, wet molds, and chill. Serve plain or with whipped cream.

Calories, 1006: protein, 12 grams; carbohydrate, 240 grams.

ORANGE JELLY II
(Individual rule)

1 tsp. granulated gelatin
1 tbsp. cold water
3 tbsp. boiling water
3 tbsp. orange juice
2 tsp. lemon juice
2 tbsp. sugar

Follow directions for Orange Jelly I.

Cut an orange in half, crosswise, remove the pulp with spoon and strain through cheesecloth. Fill the halves with jelly and when hardened cut with a sharp knife into thirds, thus leaving the rim filled with jelly. Serve three pieces on small plate with whipped cream in center.

Calories, 151: protein, 2 grams; carbohydrate, 36 grams.

PEACH JELLY
(Individual rule)

1 tsp. granulated gelatin
1 tbsp. cold water
1 tbsp. boiling water
3 tbsp. peach juice
1 tsp. lemon juice
1 tbsp. sherry wine
1½ tbsp. sugar

Soak the gelatin in the cold water 5 minutes, then add the boiling water and dissolve. Add fruit juice, wine, and sugar. Strain and pour into a cold, wet mold. Chill.

Calories, 124: protein, 2 grams; carbohydrate, 29 grams.

PEACH MOUSSE

1 tsp. gelatin
1 tbsp. cold water
¾ cup cream, 30%
Saccharin to taste
Whites of 2 eggs
1½ peaches, mashed or chopped (110 grams)

Dissolve the gelatin in the cold water. Heat 2 tablespoons of the cream and add the gelatin and water. Whip the rest of the cream and the saccharin until the cream just holds its shape. Beat the egg whites until stiff. Fold the egg whites and peaches into the gelatin mixture. Pour into a mold and put into the refrigerator for 1 hour.

Calories, 619: protein, 13 grams; fat, 54 grams; carbohydrate, 20 grams.

PEPTONIZED MILK JELLY

(5 servings)

2 tbsp. granulated gelatin
1 cup cold water
1 pint "specially peptonized milk," hot
Sugar to taste
2 or 3 tbsp. best St. Croix rum, *or* brandy, etc.
Rinds and juice of one fresh lemon and orange

Soak the gelatin in the cold water for 5 minutes. Pour the hot milk over it, add the sugar, and stir until dissolved, then add the lemon and orange rinds.

Squeeze the juice of the lemon and orange into a glass and strain; stir in the rum or brandy, etc. Mix with the milk and gelatin and strain.

When the mixture has cooled to a syrup so as to be almost ready to set pour into molds or glasses wet in cold water and put on ice or in cold water or in a cold place to harden. If it is too warm when poured into the molds it is likely to separate in setting.

Calories,[9] 414: protein, 28 grams; fat, 19 grams; carbohydrate, 33 grams

PINEAPPLE BAVARIAN CREAM

(3 servings)

Dissolve a package of lemon gelatin in one-half pint of boiling water. Cool slightly, then add one-half pint juice from canned pineapple. When cold and beginning to thicken whip until it will drop from a spoon in a lumplike mass and quickly fold in one cup of grated pineapple. Add two cups whipped cream, sweetened. Pile lightly in sherbert or stem glasses and garnish with cherry rings or pineapple.

If fresh pineapple is used, boiling water must be poured over it first. Fresh pineapple contains an enzyme which prevents the gelatin from hardening.

SNOW PUDDING I

(4 servings)

1 tbsp. granulated gelatin
¼ cup cold water
Few grains salt
¾ cup sugar
1 cup boiling water
Grated rind and juice of lemon
2 or 3 egg whites, stiffly beaten

Soak the gelatin in the cold water. Bring sugar, salt and hot water to the boiling point and add the soaked gelatin. Stir and strain. Add the

[9] Calculated without sugar and liquor.

lemon rind and juice. Cool and when beginning to set beat with an egg beater until light and fluffy. Fold in the stiffly beaten egg whites and serve with soft custard made from egg yolks. Rind of lemon may be omitted if its use is prohibited.

Calories, 677: protein, 11 grams; carbohydrate, 158 grams.

SNOW PUDDING II
(Individual rule)

2 tsp. granulated gelatin	1/3 cup boiling water
3 tbsp. cold water	3 tbsp. sugar
1 1/2 tbsp. lemon juice	White of 1 egg

Blend as for Snow Pudding I, adding a little grated rind of lemon.

Calories, 207: protein, 7 grams; carbohydrate, 45 grams.

SPANISH CREAM I
(8 servings)

1 tbsp. granulated gelatin	1/8 tsp. salt
1/4 cup cold milk or water	1 tsp. vanilla *or*
2 1/2 cups hot milk	2 tsp. sherry
1/2 cup sugar	3 eggs

Soften the gelatin in the cold milk or water. Beat the egg yolks in the top of double boiler and add the sugar and gradually the hot milk. Place the boiler over hot water and stir until the custard thickens, then remove boiler immediately and add the softened gelatin, salt, and flavoring, stirring till the gelatin dissolves. Fold in the stiffly beaten egg whites and pour into cold, wet molds to harden. Serve with Soft Custard I or with whipped cream.

Calories,[10] 1134: protein, 48 grams; fat, 43 grams; carbohydrate, 139 grams.

SPANISH CREAM II
(Individual rule)

1 tsp. granulated gelatin	1 egg
1 tbsp. cold water	2/3 cup milk
3 tbsp. boiling water	1/4 tsp. vanilla
2 tbsp. sugar	Pinch of salt

Blend as for Spanish Cream I and serve with orange sauce.

Calories,[10] 317: protein, 14 grams; fat, 12 grams; carbohydrate, 38 grams.

[10] Without topping.

STRAWBERRY MOUSSE I

(6 servings)

1 tbsp. granulated gelatin	1 pint thick cream
1/4 cup cold water	1/2 cup powdered sugar
1/4 cup boiling water	1 cup strawberry juice

Soften the gelatin in the cold water for 5 minutes, then add the boiling water and dissolve. Whip the cream until stiff and add the powdered sugar. Add the strawberry juice to the gelatin, fold the cream in carefully, turn into a wet mold, and freeze without stirring for 2 hours.

Calories, 2311: protein, 18 grams; fat, 193 grams; carbohydrate, 126 grams.

STRAWBERRY MOUSSE II

Follow the recipe for Peach Mousse, using 3/4 cup (165 grams) of strawberries, crushed or chopped, instead of peaches.

Calories, 630: protein, 14 grams; fat, 55 grams; carbohydrate, 20 grams.

WINE JELLY I

(Individual rule)

1 tsp. granulated gelatin	2 tbsp. sherry wine
1 tbsp. cold water	1 tbsp. orange juice
1/4 cup boiling water	1 tsp. lemon juice
2 tbsp. sugar	

Soak the gelatin in the cold water 5 minutes, then add the boiling water and dissolve. Add the sugar, wine, orange, and lemon juice. When the sugar is dissolved, strain through a cheesecloth into cold, wet molds, or a shallow soup plate. Chill. When firm, cut into half-inch cubes and serve in sherbet or champagne glasses or half orange shell with a little whipped cream on top.

Calories, 136: protein, 2 grams; carbohydrate, 32 grams.

WINE JELLY II

(6 servings)

2 tbsp. granulated gelatin	2 cups boiling water
1/2 cup cold water	1 cup sherry wine
1 1/2 cups sugar	Speck salt

Cover the gelatin with the cold water and let it stand about 1/2 hour. Add the boiling water, sugar, and salt. Stir till the gelatin is dissolved and add the wine. Strain through a cloth and strainer into cold, wet molds and chill. Serve plain or with whipped cream.

Calories, 1300: protein, 10 grams; carbohydrate, 315 grams.

PUDDINGS

BREAD PUDDINGS

PLAIN BREAD PUDDING

(3 servings)

1 cup milk	2 tbsp. sugar
1 tbsp. butter	1/8 tsp. salt
1 egg	1 cup stale bread
	1/4 cup seeded raisins

Scald the milk and add the butter. Beat the egg, add the sugar and salt, and pour the scalded milk on gradually. Cut the bread into half-inch cubes and add with raisins. Pour into a well-buttered pudding dish, put bits of butter on top, and bake in a moderate oven (375° F.) until custard is set, about 30 minutes. Serve with hard sauce or cream and sugar.

Calories, 720: protein, 21 grams; fat, 28 grams; carbohydrate, 95 grams.

BROWN BETTY

(Individual rule)

Bread crumbs	Cinnamon
1 large sour apple	2 tsp. butter
Sugar	

Place a layer of bread crumbs in a well-buttered individual baking dish, cover with one-half apple cooked as for apple sauce, or raw, cut in thin slices or chopped. Season with sugar, speck of cinnamon and bits of butter. Add another layer of crumbs, then the remaining half apple, seasoning, and finally crumbs. Place bits of butter on top, place in a moderate oven (375° F.) and bake 30 minutes.

Calories,[11] 292: protein, 3 grams; fat, 9 grams; carbohydrate, 50 grams.

CHOCOLATE BREAD PUDDING

(2 servings)

1/2 cup stale bread crumbs	2 1/2 tbsp. sugar
1 cup milk	Pinch of salt
1/2 square unsweetened chocolate	1 egg, beaten
	1/4 tsp. vanilla

Soak the bread crumbs in the milk. Melt the chocolate over hot water and add to it the sugar and salt. To the chocolate mixture, add the soaked

[11] Calculated with 2 tsp. sugar and 1 large slice bread.

crumbs, the beaten egg, and the vanilla. Put into buttered custard cups and bake in a moderate oven (375° F.) about 20 minutes, or until custard is set. Serve hot, plain or with hard sauce.

Calories, 604: protein, 20 grams; fat, 24 grams; carbohydrate, 77 grams.

JELLY BREAD PUDDING

Prepare as for Lemon Bread Pudding, omitting the lemon rind and juice. Spread any tart jelly over the pudding when baked and add meringue.

LACTOSE BREAD PUDDING (Coleman)

1 slice of bread (3/8 inch thick)
1/2 oz. butter (1 level tbsp.)
1 1/2 oz. milk sugar (4 1/2 tbsp.)
6 oz. milk (12 tbsp.)
1 egg

Spread the bread with butter and cut into squares. Beat the egg slightly, heat the milk and sugar, stirring constantly; mix with the egg and pour over the bread. Grate nutmeg over the top and bake in a moderate oven (375° F.) 30 minutes, until the custard is set.

Calories, 573: protein, 15 grams; fat, 26 grams; carbohydrate, 70 grams.

LEMON BREAD PUDDING

(2 servings)

1/2 cup milk
1/2 cup soft bread crumbs
1 egg
Pinch of salt.
3 tbsp. granulated sugar
2 tbsp. powdered sugar
1/2 tbsp. butter
Grated rind and juice of of 1/4 lemon

Scald the milk and add the butter. Beat the egg yolk, add the salt and sugar and pour the scalded milk on gradually. Add bread crumbs and grated lemon rind, pour into a buttered pudding dish and bake in a slow oven (325° F.) about 30 minutes, or until set like baked custard.

Make a meringue by whipping the white of the egg very stiff, adding 2 tablespoons powdered sugar and the juice of one-fourth lemon. Cover the pudding with this and set in the oven till a light brown.

For the crumbs, rub soft bread through a coarse strainer or colander. Do not use lemon rind if it will interfere medicinally.

Calories, 553: protein, 13 grams; fat, 17 grams; carbohydrate, 87 grams.

ORANGE BREAD PUDDING

(2 servings)

¾ cup stale bread	2 oranges
½ cup milk	6 tbsp. sugar
2 eggs	

Soak the bread in the milk until soft and add the egg yolks. Beat lightly with a fork. Add the grated rind of one orange and the juice of both and sweeten. Whip the whites very light and add to the mixture. Pour into buttered custard cups. Set the cups in a pan of hot water and bake in a moderate oven (375° F.) until the custard is set, about 30 minutes. Serve plain or with hard sauce. Omit the orange rind if it will interfere medicinally.

Calories, 800: protein, 22 grams; fat, 17 grams; carbohydrate, 139 grams.

CORNSTARCH PUDDING OR BLANC MANGE

Starch of various kinds is used in milk puddings. For children, invalids, and dyspeptics such puddings are admirable. They must be cooked long enough so that the starch is thoroughly cooked. The combination of starch and milk gives a wholesome nutritive food, and the addition of eggs increases the food vaule.

CORNSTARCH PUDDING

(2 servings)

1 cup milk	Pinch of salt
1½ tbsp. cornstarch	White of 1 egg, stiffly beaten
1½ tbsp. sugar	Vanilla

Scald the milk in a double boiler. Mix cornstarch, sugar, and salt thoroughly and add the scalded milk slowly, stirring constantly. Return to the top of the boiler, and cook 20 minutes, stirring constantly for the first 5 or 6 minutes, then occasionally. Remove from fire and while very hot fold in the well-beaten white of egg lightly but thoroughly. When partially cooled, add flavoring to taste, put into wet cups or molds, cool, and let stand for several hours on ice. Remove from molds. Serve with a soft custard, mashed fresh berries, or whipped cream. Vary the pudding by adding a little melted chocolate.

Calories, 322: protein, 12 grams; fat, 9 grams; carbohydrate, 48 grams.

CORNSTARCH FRUIT JELLY

(2 servings)

1 cup raspberry juice	2 tbsp. cornstarch
Sugar to taste	

Sweeten the juice to taste and heat to the boiling point. Make a smooth paste of the cornstarch and a little cold water, add slowly to the juice, and cook 30 minutes in the top of the double boiler, stirring constantly at first. Pour into cold, wet molds. Serve cold with whipped cream and fresh, whole berries.

Calories without sugar, 150: protein, 1 gram; carbohydrate, 37 grams.

IRISH MOSS BLANC MANGE

(6 servings)

1/4 cup Irish moss	1/16 tsp. salt
1 1/2 cups cold water	1/3 tsp. vanilla
1 3/4 cups milk	

Soak the moss in the cold water about 15 minutes. Remove from the water, pick over, and put into a double boiler with the milk. Cook about 20 minutes, or until it thickens when dropped on a cold plate. Add the salt, strain, and flavor. Strain again and turn into small cold, wet molds. Chill and serve with cream and sugar or sliced fruit.

Calories, 290: protein, 15 grams; fat, 16 grams; carbohydrate, 21 grams.

MALTED MILK BLANC MANGE

(2 servings)

2 tbsp. malted milk powder	Pinch of salt
2 tbsp. powdered arrowroot	1 1/2 cups boiling water
1 tbsp. sugar	1/4 tsp. vanilla

Mix the arrowroot and malted milk powder with a little cold water into a smooth paste. Put the sugar, salt, and boiling water in the top of a double boiler. Slowly stir in the paste and cook about 20 minutes, or until the arrowroot is thoroughly cooked. Add the vanilla and pour into cold, wet molds. Chill and serve with soft custard or whipped cream.

For coffee blanc mange, 1 teaspoon powdered coffee may be added before cooking.

Calories, 198: protein, 3 grams; fat, 2 grams; carbohydrate, 42 grams.

PINEAPPLE CREAM

(2 servings)

1 cup milk	Pinch of salt
1½ tbsp. cornstarch	White of 1 egg
1½ tbsp. sugar	2 tbsp. grated pineapple

Follow directions for Cornstarch Pudding, adding the pineapple instead of vanilla. Pour into individual molds and serve cold with cream.

Calories, 342: protein, 12 grams; fat, 9 grams; carbohydrate, 53 grams.

RICE PUDDINGS

PLAIN RICE PUDDING

(3 servings)

1 cup scalded milk	⅛ tsp. salt
½ tbsp. butter	1 cup steamed rice
1 egg	¼ cup stoned raisins
2 tbsp. sugar	

Scald the milk and add butter. Beat the egg, add the sugar and salt, and pour on the scalded milk slowly. Put into a buttered pudding dish with rice and raisins. Bake in a slow oven (325° F.) until the custard is set. Serve with hard sauce.

Do not use raisins in cases of bowel trouble.

Calories, 649: protein, 18 grams; fat, 22 grams; carbohydrate, 95 grams.

CREAM OF RICE PUDDING

(3 servings)

2 tbsp. rice, well washed	¼ tsp. salt
2 tbsp. sugar	1 pint milk
Grated rind of ⅓ lemon	

Mix all ingredients in a small baking dish. Bake 2 hours, slowly at first, until rice is softened and thickened in the milk. Cut the crust several times, stirring to the bottom gently. The crust will then dissolve in the pudding, giving it a creamy color. Then let it brown slightly.

Calories, 522: protein, 18 grams; fat, 19 grams; carbohydrate, 69 grams.

RICE MERINGUE

(2 servings)

- 1/4 cup cold cooked rice
- 1 cup scalded milk
- 1 egg
- 2 1/2 tbsp. sugar
- 1/8 tsp. salt
- Vanilla
- 2 tbsp. powdered sugar

Blend rice and milk and soak until soft. Separate the egg and beat the yolk, add sugar and salt, and gradually the hot milk and rice. Cook until it thickens like soft custard. Flavor to taste and pour into a buttered pudding dish or custard cups. Make a meringue of the white of egg and powdered sugar, cover pudding, and brown slightly in oven.

Calories, 526: protein, 16 grams; fat, 15 grams; carbohydrate, 81 grams.

SOUTHERN SNOWBALLS

(2 servings)

- 1/4 cup rice
- 1/4 tsp. salt
- 1 cup milk

Pick over the rice, wash in several waters, and put into the top of a double boiler with the milk and salt. Cook until the milk is absorbed and the rice is tender. Do not stir while cooking. Dip egg cups in cold water and pack with rice carefully but tightly, turn out on serving dish, sprinkle with powdered sugar, put a candied cherry or a strawberry on top, and serve with whipped cream.

Calories, 336: protein, 12 grams; fat, 10 grams; carbohydrate, 50 grams.

TAPIOCA PUDDINGS

APPLE TAPIOCA

(5 servings)

- 3 tart apples
- 1 pint boiling water
- 1/4 cup granulated tapioca
- 1 tbsp. sugar
- Salt
- Nutmeg

Pare and quarter the apples. Place in dish and cover with sugar, salt and a little nutmeg. Cook the water and tapioca 15 minutes in a double boiler, stirring frequently. Pour over apples and bake in a moderate oven (375° F.) about half an hour, until the apples are soft. Serve with cream and sugar.

Calories, 414: protein, 1 gram; fat, 1 gram; carbohydrate, 100 grams.

CHOCOLATE OR COCOA BLANC MANGE

(3 servings)

1½ cups hot chocolate *or* cocoa
¼ cup granulated tapioca
¼ cup sugar
¼ tsp. salt
¼ tsp. vanilla

Put the chocolate in the top of a double boiler and add the tapioca, sugar, and salt. Cook 15 minutes. Remove from heat, add vanilla, and pour into cold wet molds. Serve cold, plain or with whipped cream or soft custard.

Calories, 810: protein, 14 grams; fat, 26 grams; carbohydrate, 130 grams.

DATE TAPIOCA

(3 servings)

1 cup hot milk
1½ tbsp. granulated tapioca
1 tbsp. sugar
⅛ tsp. salt
1 egg
¼ cup chopped dates

Cook the milk, tapioca, sugar, and salt 15 minutes in a double boiler, stirring frequently. Separate the egg. Add the beaten egg yolk and cook 3 minutes longer. Stir in the dates. Make a meringue of the white of egg, heap it on top, and brown delicately in the oven.

Calories,[12] 533: protein, 16 grams; fat, 15 grams; carbohydrate, 83 grams.

ORANGE TAPIOCA

(3 servings)

3 cups hot water
¼ cup granulated tapioca
1 tbsp. lemon juice
3 tbsp. sugar
¼ tsp. salt
3 oranges

Put everything except the oranges in the top of a double boiler. Cook 15 minutes, stirring frequently. Pour this over oranges, divided into sections and cut in rather small pieces. Serve cold.

Calories, 492: protein, 3 grams; fat, 1 gram; carbohydrate, 118 grams.

PINEAPPLE TAPIOCA

(3 servings)

1½ cups boiling water
¼ cup granulated tapioca
¼ cup sugar
1 cup canned grated pineapple
Salt

Cook the water, tapioca, sugar, and salt 15 minutes in a double boiler,

[12] Calculated with hot chocolate: 1½ cups milk, ¾ square bitter chocolate, 1 tablespoon sugar.

stirring frequently. Remove from the heat, pour over grated pineapple, and decorate the top of the pudding with currant jelly.

Calories, 534: protein, 2 grams; carbohydrate, 132 grams.

RASPBERRY TAPIOCA

(3 servings)

1 cup boiling water	½ cup raspberry juice
1½ tbsp. granulated tapioca	Juice of ½ lemon
1½ tbsp. sugar	Salt to taste

Cook the water, tapioca, and salt 15 minutes in a double boiler, stirring frequently. Add the sugar and lemon juice and pour over sweetened raspberries. Serve plain or with whipped cream. Strawberries or loganberries may be used in place of raspberries.

Calories, 210: protein, 1 gram; carbohydrate, 51 grams.

TAPIOCA CREAM

(2 servings)

1 cup hot milk	1 egg
1½ tbsp. granulated tapioca	1½ tbsp. sugar
⅛ tsp. salt.	Flavoring

Cook the hot milk, tapioca, and salt 15 minutes in a double boiler, stirring frequently. Separate the egg. Blend the well-beaten yolk with the sugar until creamy and pour into the cooked tapioca. Cook until it begins to thicken like custard. Remove from heat and whip in the beaten egg white. Add vanilla, orange or any flavoring desired.

This may be poured cold over any fruit or berries, either fresh or canned. Raisins, prunes, figs, dates, or nuts may be stirred into it while cooking.

Calories, 415: protein, 15 grams; fat, 15 grams; carbohydrate, 55 grams.

SAUCES AND ACCOMPANIMENTS FOR DESSERT

CUSTARD SAUCE

Use Soft Custard I, page 516.

FOAMY SAUCE

(3 servings)

¼ cup butter	½ egg
½ cup powdered sugar	1 tbsp. wine

Cream the butter, add the sugar, the well-beaten egg, and the wine. Heat over hot water, beating constantly. Serve immediately.

Calories, 822: protein, 4 grams; fat, 49 grams; carbohydrate, 92 grams.

FRUIT SAUCE

(2 servings)

½ tsp. arrowroot *or* cornstarch
6 tbsp. fruit juice

Blend the starch with a little cold water and pour into the hot fruit juice. Boil 2 or 3 minutes. Sweeten if desired.

Calories, 70: carbohydrate, 17 grams.

GOLD SAUCE

Yolks of 2 eggs
1 cup powdered sugar
Lemon juice or vanilla

Beat the yolks very light and add the powdered sugar gradually, beating constantly. Add seasoning and serve.

Calories, 846: protein, 5 grams; fat, 10 grams; carbohydrate, 184 grams.

HARD SAUCE

(4 servings)

3 tbsp. butter
9 tbsp. powdered sugar
½ white of egg
½ tbsp. cream
Nutmeg

Cream the butter and add the sugar gradually. When light and creamy add the unbeaten white of egg and the cream, a drop or two at a time. Season highly. Heap on a serving dish and cool.

Calories, 800: protein, 2 grams; fat, 40 grams; carbohydrate, 108 grams.

HOT COCOA SAUCE FOR ICE CREAM

(6 servings)

1½ cups water
1 cup sugar
1 tbsp. arrowroot
2 tbsp. cocoa
Pinch of salt
1 tsp. vanilla

Boil the water and sugar together for 2 minutes. Add the arrowroot mixed with a little cold water, stir for a moment, then boil until clear. Add the cocoa, which has been mixed with a little hot water, and the salt and boil 3 minutes longer. Remove from the fire and add the vanilla.

Calories, 921: protein, 1 gram; fat, 3 grams; carbohydrate, 223 grams.

ORANGE BASKETS

Wash the oranges. Remove two sections from the upper half of each orange, leaving a band of peel for a handle. Dig out the pulp and scrape clean. Fill with lemon or orange jelly cut into cubes. An attractive form to serve to children.

If these shells are wrapped in a damp cloth, they will retain their shape for hours.

ORANGE SAUCE

(3 servings)

Whip the white of one egg very light, add 2 tablespoons sugar gradually, beating constantly, then add 1½ tablespoons of orange juice and 1 teaspoon of lemon juice.

Calories, 147: protein, 3 grams; carbohydrate, 34 grams.

ORANGE AND LEMON STRAWS

Peel the orange (or lemon) lengthwise and cut into long, narrow strips, about ¼ inch wide. Put into a saucepan and cover with cold water. Bring to the boiling point and pour off the water, repeating this process five or six times, or until the bitter taste of the peel is extracted. Drain thoroughly and cover with granulated sugar. Cook until the syrup is thick and hardens in cold water. Then roll the straws in granulated sugar and cool. Serve with orange ice, etc., or as a bonbon.

VANILLA SAUCE

2 tbsp. butter
2 tbsp. flour
1 cup boiling water
¼ cup sugar
1 tsp. vanilla

Melt the butter, add the flour, and stir until smooth. Add the boiling water and sugar and cook thoroughly. Add flavoring and serve.

One tablespoon of cornstarch may be substituted for the flour.

Calories, 480: protein, 2 grams; fat, 24 grams; carbohydrate, 63 grams.

WHIPPED CREAM I

Do not have cream too thick. To ½ cup thick cream, add 3 tablespoons milk. Season with sugar and any flavoring desired, put into a bowl, and set the bowl in another utensil containing a little cold water and ice. Beat the cream with a rotary egg beater until stiff enough to keep its form. Set on ice to keep cold.

Do not beat too long or it may turn to butter.

WHIPPED CREAM II

Follow the preceding recipe. Whip the white of one egg stiff and fold it into the stiffly beaten cream.

WHIPS AND SOUFFLÉS

Dainty and nutritious ways to serve uncooked and slightly cooked whites of eggs are found in whips and soufflés.

The apple is a favorite fruit for whips. The juice of fresh fruits in season used with the raw white of egg makes an appetizing as well as very nutritious lunch for the sick.

CHEESE SOUFFLÉ

(6 servings)

- 2 tbsp. butter
- 3 tbsp. flour
- ½ cup scalded milk
- ½ tsp. salt
- Few grains cayenne
- ¼ cup grated American cheese
- 3 eggs

Melt the butter, add the flour, and when well mixed add gradually the scalded milk. Then add salt, cayenne, and cheese. Remove from fire; add yolks of eggs beaten until lemon-colored. Cool the mixture and cut and fold in whites of eggs beaten until stiff and dry. Pour into a buttered baking dish and bake 20 minutes in a slow oven. Serve at once.

Calories, 740: protein, 34 grams; fat, 57 grams; carbohydrate, 23 grams.

CUSTARD SOUFFLÉ

(Individual rule)

- ¾ tbsp. butter
- 1¼ tbsp. flour
- ¼ cup scalded milk
- 1 egg
- 1¼ tbsp sugar

Melt the butter, add the flour, and gradually add the scalded milk. Cook thoroughly. Beat the egg yolk until thick and lemon-colored. Slowly pour the milk mixture over it. Add the sugar and cool. Beat the white until stiff and dry and fold in. Turn into buttered custard cups and bake in a slow oven about 15 minutes until firm. Test by pressing with the finger. Take from oven and serve at once, or it will fall. Serve with foamy sauce.

Calories, 311: protein, 10 grams; fat, 17 grams; carbohydrate, 29 grams.

FRUIT WHIP

(2 servings)

Any fruit, fresh, canned, or dried, properly prepared, or jellies may be used.

2 to 4 tbsp. fruit pulp
White of 1 egg
Lemon juice
2 tbsp. powdered sugar
or to taste

Prepare the fruit pulp by scraping, grating, or rubbing through a strainer. Whip the white of egg until stiff. Add pulp, sugar, and lemon juice to taste and whip until very stiff. Heap in the center of a serving dish and pour Soft Custard I around it.

GRAPE WHIP

(6 servings)

White of 1 egg
¾ cup grape juice
5 tbsp. sugar
1 cup heavy cream

Whip the egg white until foamy, add the grape juice mixed with the sugar, and finally the cream, then beat with a whip churn. Take off the froth as it rises and drain on a sieve. Pour the unwhipped mixture into small, high glasses and pile the whip on top. Serve cold.

Calories, 1350: protein, 9 grams; fat, 96 grams; carbohydrate, 112 grams.

LEMON SOUFFLÉ

(Individual rule)

1 egg
Juice of ¼ lemon
¼ cup sugar

Separate the egg. Beat the yolk until thick and lemon-colored. Add the sugar slowly, beating constantly, then add lemon juice. Fold in the white, whipped until dry. Pour into buttered custard cups, set in pan of hot water and bake 20 minutes or until firm. Test by pressing with finger. Serve plain or with foamy sauce.

Calories, 289: protein, 6 grams; fat, 6 grams; carbohydrate, 53 grams.

OMELET SOUFFLÉ

(Individual rule)

Yolk of 1 egg, well beaten
3 tbsp. powdered sugar
Pinch of salt
2 tbsp. lemon juice
Grated rind of lemon
Whites of 2 eggs
Strawberry or fruit jam

To the well-beaten yolk add the sugar, salt, lemon juice and rind. Whip

the whites to the stiffest possible froth, then cut and fold into the yolk. Have ready a small baking dish, buttered and spread with a layer of the fruit. Pour the omelet over it and bake in a moderate oven (375° F.) 15 or 20 minutes. Test as for baked custard. Serve at once.

Do not use lemon rind if it will interfere medicinally.

Calories, without jam, 227: protein, 9 grams; fat, 5 grams; carbohydrate, 37 grams.

PEACH MERINGUE

(2 servings)

1 cup yellow peaches
Sugar to taste
1 egg
Bread crumbs
1 tbsp. powdered sugar

Stew the peaches in a very little water and sweeten to taste. Separate the egg and beat the yolk until thick and lemon-colored. Stir the cooked peaches into the yolk. Butter a pudding dish and cover the bottom with fine bread crumbs. Put in the peaches and bake 15 minutes. Cover with a meringue made of the egg white and the powdered sugar. Brown slightly in the oven and serve cold.

PRUNE SOUFFLÉ

1 cup prunes
1/3 cup sugar
Whites of 3 eggs
Lemon juice

Wash the prunes and soak several hours in cold water to cover. Cook in the same water until soft, when water should be evaporated. Remove the stones, using a silver knife and fork, and force the pulp through a sieve. Add the sugar and lemon juice to taste and reheat to dissolve sugar, then cool. Beat the egg white until stiff. Add gradually, while beating constantly, the prune mixture. Pile lightly on a buttered dish and bake in a slow oven 8 or 10 minutes. Serve cold with cold soft custard seasoned with lemon or orange.

Calories, 761: protein, 13 grams; fat, 1 gram; carbohydrate, 175 grams.

STRAWBERRY WHIP

(4 servings)

1 cup of fresh strawberries
Whites of 2 eggs
1/3 cup powdered sugar

Wash and hull the strawberries and mash slightly. Whip the whites of eggs until stiff. Add sugar and berries and whip until very stiff, using a broad bowl and a wire egg beater, beating with a long, steady stroke. Pile lightly in a glass dish and serve with white or sponge cake

Calories, 352: protein, 8 grams; fat, 1 gram; carbohydrate, 78 grams.

33.
EGGS

Egg usually means hen's egg, but the eggs of all birds and of turtles are edible. Eggs other than hen's eggs are not, however, suitable for the sick because of their strong flavor. There is no difference in food value between the brown egg and the white egg. The color of the shell is due to a pigment and has no connection with the composition of the egg.

Composition Eggs contain protein, fat, mineral matter, and vitamins. The composition of hen's eggs is as follows:

WHOLE EGG	PROTEIN %	FAT %	CARBO-HYDRATE %	CAL-CIUM %	PHOS-PHORUS %	IRON %
Whole egg	12.8	11.5	0.7	.054	.224	.0027
White	10.8	0	0.8	.011	.015	.0001
Yolk	16.3	31.9	0.7	.157	.586	.0072

Egg white consists of eight-tenths water. The remainder is principally protein, with a little mineral matter. The yolk is about half water, one-third fat, and nearly one-sixth protein, with almost twice as much mineral matter as the white.

Nutritive Value Eggs, while not a cheap food, are very nutritious and comparable in protein with meat, milk, cheese, and fish. Their nutritive value is such that they furnish a good return for the money expended. They are valuable for giving variety to the diet and for furnishing an easily digested protein food, especially for the sedentary. Many persons will be satisfied with an egg who would not be with the equivalent food value in the form of meat. For children they are much better than meat, because the fat is in an emulsified form and hence easily digested, because they furnish ash and vitamins, and because they do not contain the stimulating extractives which are present in meat.

The yolk is rich in all substances necessary for growth except cal-

cium and ascorbic acid. The yolk contains most of the ash and is rich in iron and fair in calcium. It is rich in vitamin A and is a good source of thiamine, riboflavin, and vitamin D.

Egg yolks are frequently prescribed for invalids requiring an easily assimilated, concentrated food. It should be remembered, however, that when fat is barred from the diet, egg yolk should not be given.

Egg white is valuable chiefly as a source of protein and riboflavin. Because of its mild flavor it can be combined with many substances, especially milk and other beverages. The food value of an egg is as follows:

FOOD VALUE OF EGGS

AVERAGE EGG WITHOUT SHELL

	TOTAL (*grams*)	PROTEIN (*grams*)	FAT (*grams*)	ENERGY VALUE (*calories*)	VITAMIN (I.U.)	THIAMINE (*mcgm.*)	RIBO-FLAVIN (*mcgm.*)	NIACIN (*mcgm.*)
Whole	50	6.4	5.8	79	500	73	175	33
White	28	3.0	0	13	0	0	64	21
Yolk	16	2.6	5.1	57	448	67	78	6

Digestibility When fresh and properly cooked, eggs are easily digested and very thoroughly absorbed in the intestines. Carelessness in cooking and serving eggs may make them both difficult to digest and unappetizing.

A soft-cooked egg digests very easily. A hard-cooked one is slower to digest when prepared in the common manner. But if it is cooked at the right temperature and chopped fine, a hard-cooked egg will digest about as quickly as a soft-cooked one. Raw eggs are added to various foods such as milk and broth to give extra nutriment.

Principles of cookery Eggs should always be cooked at low temperature. High temperature toughens the egg white and makes the iron in the yoke unite with the sulphur in the white to produce an unpleasant greenish color. Remove the eggs from the heat the moment they are done and serve instantly because eggs frequently continue to cook by the heat stored in them if they are allowed to stand.

Eggs to be cooked in the shell should be taken out of the refrigerator and allowed to stand at room temperature for a while. Otherwise the shell may crack.

The proper temperature for cooking egg albumin is 160° F. to 180° F. That temperature will produce a soft, tender, jelly-like egg

white, easily digested. Egg white cooked at 212° F. is hard, tough, and difficult to digest.

Egg yolk, on the other hand, is more easily digested if it is hard-cooked at the proper temperature than if it is soft-cooked. It is often advisable, therefore, to cook the yolks and whites separately.

Care of eggs Eggs should always be kept under refrigeration, both in the store and at home. Never wash eggs until you are ready to use them because washing leaves the shell porous, and bacteria can enter the egg. The pores in an eggshell also let odors seep into the egg; hence eggs should not be kept near any strong food.

How to tell a fresh egg To test the freshness of an egg, hold it in front of an electric light or candle in a dark room. The egg is fresh if it is perfectly translucent throughout. When a fresh egg is broken into a saucer, the white is thick, and the yolk sits up well above the white, If the yolk flattens out or the white looks runny, the egg is stale.

CODDLED EGGS

Put water in a narrow, straight-sided vessel such as the top of a double boiler. Use 1⅓ cups of water for each egg to be coddled; but if only one egg is to be cooked, use a little more. Bring the water to a boil and take off the heat before the eggs are put in. The cold eggs will bring down the temperature of the water to about 160° F. so the eggs will cook slowly. Let the eggs stand in the water 6 minutes for a very soft-cooked egg and 8 minutes for a medium-cooked one. The white of the egg should be jellied and the yolk soft.

CREAMED EGGS
(Individual serving)

1 egg
¾ cup milk
1 tsp. butter
¼ tsp. salt
Pepper

Beat the egg with a fork in the top of a double boiler until light. Add the milk, butter, and seasonings. Place over boiling water and stir with a fork several times at first, then cover the top of the boiler and let the egg cook until it sets like a custard. Do not stir or cook too long, or the egg will separate. Remove by spoonfuls, serve plain on toast or hot rice.

Top milk may be used and the butter omitted.

Calories, 241: protein, 13 grams; fat, 17 grams; carbohydrate, 9 grams.

DEVILED EGGS

(Individual serving)

1 hard-cooked egg
1 tsp. butter or olive oil
1/8 tsp. mustard
Salt and paprika

Remove the shell and cut the egg in half lengthwise. Take out the yolk without breaking the white. Rub the yolk to a smooth paste with the butter or olive oil and seasonings. Mix thoroughly. A small quantity of finely chopped ham, tongue, or chicken may be added. Fill the whites with the mixture and serve on lettuce or in a bed of parsley.

Calories, 116: protein, 6 grams; fat, 10 grams.

EGGS GOLDENROD

(Individual serving)

1 hard-cooked egg
2 tsp. butter
1/2 tbsp. flour
1/2 cup scalded milk
White pepper
Salt
2 slices toast

Remove the shell from the egg and separate the yolk and white. Chop the white very fine. Rub the yolk through a sieve. Melt the butter in a saucepan, stir in the flour, and gradually add the hot milk. Cook thoroughly and season. Add the chopped egg white and pour over the toast. Sprinkle the sieved yolk on top.

Calories, 405: protein, 16 grams; fat, 20 grams; carbohydrate, 40 grams.

HARD-COOKED EGGS

Put enough water to cover the eggs in a saucepan. Bring the water to a boil. Lower the eggs into the water and reduce heat so that the water simmers but does not boil. Simmer for 15 minutes. Plunge the eggs immediately into cold water to loosen the shell.

OMELET

(Individual serving)

1 egg
1 tbsp. milk
1/8 tsp. salt
Pepper
2 tsp. butter

Separate the egg and beat the white to a stiff froth. Beat the yolk until light, add the milk and salt and pepper. Fold the yolk lightly into the white. Put the butter into a frying pan or omelet pan; when it bubbles pour

in the egg. Shake the pan gently so the omelet will not stick to it. Lift up the omelet at the sides to see when it is a delicate brown. At that point set the pan in the oven a minute to cook the top. Fold the omelet in half, turn out on a hot dish, and serve immediately.

Omelet may also be baked. Prepare the egg and add chopped meat if desired. Pour into a buttered pudding dish, set the dish in a pan of hot water, and bake in a moderate oven (375° F.) until firm.

Calories, 162: protein, 7 grams; fat, 14 grams; carbohydrate, 1 gram.

POACHED EGGS

Fill a shallow pan two-thirds full of boiling salted water, using 1 tsp. salt to 1 pint of water. In the water put a slightly buttered muffin ring on a buttered skimmer, and break an egg into the ring. When there is a film on top and the white is firm, carefully pick up the skimmer, remove the ring, and loosen the egg with a knife. Place the egg on a square or round of toast and garnish with a sprig of parsley.

POACHED EGGS IN CREAM

1 egg	Salt to taste
1½ tsp. butter	2 tbsp. grated cheese
½ cup thin cream	Toast

Melt the butter in the top of a double boiler. Add the cream. When the cream is hot drop in the egg. Cook until the white is nearly firm, add salt, and sprinkle with cheese. Pour onto a slice of toast.

Calories, 435: protein, 15 grams; fat, 32 grams; carbohydrate, 22 grams.

SCRAMBLED EGGS
(Individual serving)

1 egg	Pepper
2 tbsp. milk	1 tsp. butter
¼ tsp. salt	

Beat the egg with a fork until light. Add the milk and salt and pepper. Melt the butter in a frying pan, keeping the heat very low so the butter does not brown. Pour in the egg. Stir when the bottom layer of egg is firm, scraping up the cooked egg each time until the whole is set like custard. Or scrambled eggs may be made in the top of a double boiler like Creamed Eggs, stirring all the while.

Calories, 142: protein, 8 grams; fat, 11 grams; carbohydrate, 2 grams.

SHIRRED EGGS

Butter egg shirrers, ramekins, or small earthen cups. Put 1 egg in each without breaking the yolk. Dust with salt and pepper, put in a pan of hot water, and cook in a moderate oven until the white is set. Cover with a buttered paper to keep the egg from browning.

If preferred, line the dish with fine white bread crumbs slightly seasoned, then break the egg into it and cover with more crumbs. Serve with 2 tablespoons of tomatoes or cream sauce and garnish with parsley.

SOFT-COOKED EGGS

Put water enough to cover the eggs into a small saucepan. Bring the water to a boil and drop in the eggs. Reduce the heat so the water simmers but does not boil. Cook 3 to 5 minutes for a soft egg, 6 to 8 minutes for a medium egg.

Another method is to put the egg in the saucepan with the cold water and bring just to the boiling point. For a soft-cooked egg, remove immediately. For medium egg, let stand in the simmering water for not longer than 2 minutes.

STEAMED EGGS

Butter an egg shirrer or small sauce plate and pour in the eggs. Salt and place in a steamer over boiling water. Cook till the white is firm. An egg cooked in this way has a light, tender white which invalids can eat.

34.
FISH AND SHELLFISH

FISH

Fish is one of the most important protein foods, and a considerable amount of its protein is in the form of gelatin. Fish is less rich in extractives, hence less stimulating, than meat.

Composition Fish is similar to meat in composition, containing proteins, fats, mineral matter, and a few extractives.

Nutritive value The chief nutritive constituents of fish, as of meat, are their proteins and fats. Their energy value depends to a large extent upon the amount of fat in them. In the white-fleshed fish the fat is found principally in the liver. In the dark-fleshed fish the fat is found distributed throughout the body. The white-fleshed fish are the only ones usually considered in the cookery for the sick.

The food value of fish is as follows:

100-GRAM PORTIONS, RAW	PROTEIN (*grams*)	FAT (*grams*)	ENERGY VALUE (*calories*)
Bass	19.0	2.5	98
Bluefish	20.5	4.0	118
Cod	16.5	0.4	70
Flounder	14.9	0.5	64
Halibut	18.6	5.2	121
Mackerel, Atlantic	18.7	12	183
Salmon, Atlantic	22.5	13.4	211
Shad	18.7	9.8	163
Trout, brook	19.2	2.1	96
Trout, lake	18.0	10	164

When fish are in season Halibut, haddock, flounder and cod are in season all the year; turbot, October to May; shad, February to May; salmon, May to September; bluefish and mackerel, May to October; sturgeon, April to September; trout (lake), April to August.

Fish may be classified as follows:

Classes				Average % in edible portion[1] Fat	Protein (N x 6.25)
1. Scaly or Vertebrate	White or lean, e. g.		Bass, black	1.8	20.6
			Bass, sea	0.5	19.2
			Bass, striped	2.7	18.9
			Bluefish	4.0	20.5
			Catfish	2.5	19.0
			Cod	0.4	16.5
			Flounder	0.5	14.9
			Haddock	0.3	17.2
			Smelt	1.8	17.6
			Trout, brook	2.1	19.2
			Weakfish	1.7	17.8
	Dark or oily, e. g.		Butterfish	10.2	18.1
			Eel, American	9.1	18.6
			Halibut, steaks or sections	7	18.6
			Herring, Atlantic	6.8	19.0
			Lake trout	10.3	17.8
			Mackerel	12.0	18.7
			Salmon	13.4	22.5
			Shad	9.8	18.7
			Whitefish	6.5	22.9
2. Shellfish.	Mollusks, e. g.		Clams, meat and liquor	1.0	8.6
			Clams, liquor	0.4	6.5
			Oysters, meat and liquor	1.2	6.0
			Oysters, solids only	2.0	9.8
			Scallops, A.P.[2]	0.1	14.8
	Crustaceans, e. g.		Crabs	1.6	16.1
			Lobsters	1.9	16.2
			Shrimps, A.P.[2]	0.8	17.8
			Terrapin	3.5	21.2
			Turtle, green muscle	0.5	19.8

Digestibility The digestibility of scaly fish depends upon the quantity of fat present and the coarseness of the fiber.

Oily or fatty fish should not be eaten by those of weak digestion, nor should it be given to the sick. In some cases it may be served during advanced convalescence.

Salt fish is not as easily digested as fresh fish because the fibers are likely to be hardened in the process of salting. Salt codfish is an

[1] Based on Charlotte Chatfield and Georgian Adams, *Proximate Composition of American Food Materials,* U. S. Dept. of Agriculture Circular No. 549, Washington, D. C., 1940.

[2] As purchased.

exception, and if finely divided, and cooked and served in an appetizing way, it is a valuable and inexpensive form of protein food. As a rule dried, smoked, or pickled fish should not be given to the sick.

Test for freshness Fish may be indigestible, even poisonous, unless they are absolutely fresh, in season, and thoroughly cooked. In fresh fish the gills are red, the eyes bright and protruding; the flesh is firm, and there is no unpleasant odor. The first two conditions change after the fish has been out of the water a short time; and then, although the flavor is not as good, the fish is still not spoiled. But if the flesh is no longer firm and there is an unpleasant odor, the fish should not be used.

Principles of cookery As in meat, albumin is the principal constituent to be considered in the cooking of fish. Hence the same principles which apply to the cooking of meat apply also to the cooking of fish. Fish should be thoroughly cooked but never overcooked.

TIMETABLE FOR COOKING FISH

Broiled:	
Bluefish	12 to 15 minutes
Shad	12 to 15 minutes
Boiled:	
Lobster	25 to 30 minutes
Salmon, whole	10 to 15 minutes
Roasted:	
Large fish	45 minutes to 1 hour
Fish steaks, stuffed	45 minutes to 1 hour

BAKED FISH

The fish best for baking are bass, bluefish, haddock, salmon, sea trout, shad, mackerel, and weakfish. They may be either whole or filleted.

A whole fish to be baked usually has the head and tail left on, and it is better boned. Remove the eyes by putting the point of a knife under the eye and gently prying. Wipe the fish all over with a damp cloth. Stuff if desired. Lay on a greased fish sheet, or a strip of cotton cloth to lift it from the pan, in a dripping pan. Sprinkle with salt and pepper, brush over with olive oil or melted butter, dredge with flour, and put small pieces of salt pork around it or in strips over it. Bake uncovered in a moderate oven, basting dry fish every 10 minutes with water and butter, until the

flesh separates from the bone when tried with a fork. Oily fish do not need basting. Bake 20 to 45 minutes, depending upon the size of the fish. A 3-pound fish will take about 30 minutes.

The whole fish may be split before baking. Lay it skin side down and opened out flat. Sprinkle with salt and pepper and dot with salt pork.

Fillets or small fish should be laid in a baking dish and sprinkled with salt and pepper and dotted with fat. Bake in a hot oven 12 to 15 minutes, covered with waxed paper if preferred. Or cover the fish with cream or with a suitable sauce before baking.

BOILED FISH

This method would more accurately be described as poached fish, because the water must never be allowed to boil—only simmer.

Wipe the fish with a damp cloth—thick fish fillets, slices of fish steak, or whole fish, as desired. Allow ½ to 1 quart of water for each pound of fish. Add 1 tablespoon of vinegar or lemon juice and 2 teaspoons of salt to each quart of water. This will keep the fish white and give it flavor. If desired, add to the water herbs and spices such as peppercorns, whole cloves, bay leaf; and put in some diced onion, carrot, green pepper, celery, and chopped parsley.

If you have a long kettle with a rack on which to place the fish, use that. If not, tie it in cheesecloth or parchment paper, or if a small fish curl it up in a wire frying basket.

Immerse the fish in the water as soon as it boils. Reduce the heat and simmer until tender—10 to 20 minutes for fillets and small fish; for large whole fish allow 8 to 10 minutes a pound. When the fish is done, lift it out of the water and serve with melted butter or any fish sauce.

BROILED FISH

Whitefish, trout, bluefish, mackerel, shad, and small cod are split down the back and broiled whole, with the head and tail cut off if preferred. Halibut and salmon are cut into inch steaks and turned often while broiling.

Wipe the fish with a damp cloth. Rub dry fish with olive oil or butter and sprinkle with salt and pepper. Season oily fish. Place skin side down on a greased broiler, and turn when the flesh side is seared. Place the fish 2 inches from the heat and broil until nicely browned—10 to 15 minutes. When the flesh flakes easily it is done. Serve with lemon, butter, or any fish sauce.

CREAMED FISH

(Individual rule)

Remove the skin and bone of a cooked fish; flake off ½ cup with a fork. Season with salt, pepper, and a little lemon juice. Prepare a white sauce using ½ tablespoon of butter and flour, and ⅓ cup of hot milk. Put the cooked fish flakes into the white sauce to reheat. Serve on toast, garnished with parsley and half a slice of lemon, or serve in bread cases.

To make bread cases, cut slices of bread 2 inches thick. Round off the edges and scoop out the center, leaving a case. Brush with softened butter and brown in the oven.

CREAMED CODFISH

Flake the salt codfish into small pieces and soak 20 minutes in cold water to remove some of the salt. Prepare cream sauce as for Creamed Fish above. If you have potato water or fish water at hand, use it instead of milk for the cream sauce. Omit salt from the cream sauce.

SCALLOPED FISH

Put creamed fish into a small baking dish, cover with bread or cracker crumbs, dot with bits of butter, and brown in the oven.

STEAMED FISH

Prepare the fish as for boiled fish. Place on a greased perforated steamer rack and steam over hot water until the flesh is tender. Allow a little more time than for boiled fish.

FISH SAUCES

BUTTER CREAM

Cream a little butter and season with a speck of salt and cayenne and ½ teaspoon of lemon juice. Add finely minced parsley or chopped pickle, such as cucumber or olive. Put the sauce on the fish and place in the oven a moment until the butter is melted.

CREAM OR WHITE SAUCE

(Individual rule)

½ tbsp. butter	⅓ cup hot milk
½ tbsp. flour	Salt

Melt the butter, add the flour, and remove from fire. Gradually pour on

the milk, stirring constantly. Bring to the boiling point, cook thoroughly, and season.

Use ½ cup milk if a thinner sauce is desired.

Calories, 123: protein, 3 grams; fat, 9 grams; carbohydrate, 7 grams.

CUCUMBER RELISH

Grate ½ cucumber and add a small piece of red pepper chopped fine. Season with salt, pepper, and vinegar and serve with fish.

EGG SAUCE

2½ tbsp. butter	Speck pepper
1½ tbsp. flour	2 eggs
¼ tsp. salt	¾ cup hot water

Melt half the butter, add the flour and seasoning, and gradually pour on the hot water. Boil 5 minutes and add remainder of the butter in small pieces. Cook the eggs hard, chop fine, and add to sauce.

If preferred, omit the chopped eggs and add the yolk of 1 egg slightly beaten, cooking a few minutes. Add a few drops of lemon juice if desired.

Calories, 470: protein, 14 grams; fat, 42 grams; carbohydrate, 9 grams.

HOLLANDAISE SAUCE

2 tbsp. butter	⅛ tsp. salt
1 egg yolk	Dash of cayenne
½ tbsp. lemon juice	3 tbsp. boiling water

Put 1 tablespoon butter in the top of a double boiler. Add the other ingredients, place over hot water, and stir constantly while butter is melting. Add the second tablespoon of butter and stir until melted. As soon as the mixture begins to thicken, remove from hot water. Vary by adding a little chopped parsley or grated horse-radish root.

Calories, 277: protein, 3 grams; fat, 29 grams.

TOMATO SAUCE

½ tbsp. butter	Few grains salt
½ tbsp. flour	Few grains pepper
¼ cup strained tomato juice	

Brown the butter, add the flour, and stir until slightly browned. Remove from fire, gradually pour on the heated tomato, stirring constantly. Cook thoroughly and add salt and pepper.

A sprig of parsley, 1 clove, and a small piece of onion may be added to the tomato while heating.

Calories, 79: protein, 1 gram; fat, 6 grams; carbohydrate, 5 grams.

FISH STUFFING

(For baked fish)

½ cup butter	1 tbsp. chopped parsley
1 tbsp. grated onion	½ tsp. sage if desired
2 cups bread crumbs	½ tsp. salt
2 tbsp. lemon juice	⅛ tsp. pepper

Melt the butter in a frying pan, and add the onion and bread crumbs. Fry, stirring constantly, until the bread is lightly browned. Add the remaining ingredients, mix thoroughly, and stuff the fish. This makes enough stuffing for a 3-pound fish.

For an oily fish, reduce the butter to ¼ cup.

Calories, 1132: protein, 11 grams; fat, 94 grams; carbohydrate, 61 grams.

SHELLFISH

Only clams and oysters are considered in this section because the crustaceans, crabs and lobsters, are difficult for invalids to digest.

CLAMS

Clams come either oblong or round and small and large. Hard clams, or quahaugs, are in season all year; soft clams only half the year. The small hard clams known as Little Neck are preferred for serving raw.

Nutritive value Clams are similar in composition to oysters, and should be cooked at low temperature. They contain a tough portion which is discarded in sickroom cookery; but the clear juice, on account of its digestibility and stimulating properties, is invaluable for the sick. Clam juice will be retained when other food is rejected, and will build up the organs for the reception of more solid foods.

The food value of clams is as follows:

100-GRAM PORTIONS	ENERGY VALUE (*calories*)	PROTEIN (*grams*)	FAT (*grams*)	CARBO-HYDRATES (*grams*)	VITAMIN A (I.U.)	THIAMINE (*mcgm.*)	NIACIN (*mcgm.*)
Clams, long, meat only	78	13.6	1.7	2.1	200	25	1000
Clams, round, meat only	76	11.1	0.9	5.9	200	25	1000

CLAM BOUILLON

(2 servings)

¾ cup cold water	Salt
½ cup clam juice	Pepper
⅛ cup scalded milk	Celery salt
½ tsp. butter	White of egg or whipped cream

Blend the water and clam juice and heat to the boiling point. Add the scalded milk and butter and stir well. Season with salt, pepper, and celery salt to taste. A small quantity of cracker crumbs may be added to thicken it. Serve in heated bouillon cups garnished with 2 teaspoons of whipped cream or well-beaten white of egg.

Calories,[3] 40: protein, 1 gram; fat, 3 grams; carbohydrate, 2 grams.

CLAM BOUILLON BISQUE

(2 servings)

½ tbsp. butter	1 cup boiling water
1 tbsp. chopped onion	1 cup clam broth
½ tbsp. chopped carrot	Yolk of 1 egg
½ tbsp. flour	¼ cup thin cream

Melt the butter and add the finely chopped onion and carrot. Cook until the onion and carrot are tender, stirring occasionally. Add the flour, blending well; then gradually pour on the boiling water and the clam broth. Cook 5 minutes, strain, and return to the saucepan. Mix the egg yolk with the cream and add slowly to the bisque. Pour into heated bouillon cups and serve with small oyster crackers.

Calories, 242: protein, 5 grams; fat, 22 grams; carbohydrate, 6 grams.

CLAM COCKTAIL

Scrub the clams with a vegetable brush under a stream of water. Break the thin edges of the shell with a hammer so a knife can be inserted to cut the muscle which holds the two parts of the shell together. Remove the upper half of the shell and wipe the edges free of any grains of sand. Then cut the muscle which attaches the clam to the bottom half of the shell so it can be easily lifted out.

Arrange 6 clams on the half shell on a soup plate filled with cracked ice. Serve with cocktail sauce or with salt, pepper, and lemon juice, or with horse-radish.

Or mix shelled clams with seasonings and serve in a dessert glass.

[3] Calculated without white of egg or whipped cream.

CLAM JUICE (BROTH)

(Individual rule)

Scrub a dozen clams with a brush under running water. Place in a saucepan, with 2 tablespoons of cold water. Cover and cook till the shells open. Remove the clams from the shell and add the liquor which comes from them to that already in the pan. Strain the liquor through a double thickness of cheesecloth. Serve hot, cold, or frozen.

CLAM STEW

(Individual rule)

1 tbsp. butter
½ tbsp. flour
½ cup scalded milk
½ cup clam juice
⅛ tsp. salt
Few grains salt
6 clams, soft parts only

Melt the butter, add the flour, and gradually stir in the scalded milk and the clam juice. Cook thoroughly, season, add clams, and serve hot.

Calories, 284: protein, 12 grams; fat, 19 grams; carbohydrate, 10 grams.

CLAM SOUP

(Individual rule)

6 clams
⅛ cup cold water
1 cup milk
½ tbsp. butter
½ tbsp. flour
Salt and pepper to taste

Scrub the clams with a vegetable brush under running water. Put in a kettle with the cold water and cook until the shells open. Remove the clams from the shell and cut off the tough parts. Keep the soft parts warm for the soup, and save the juice which runs from the clams on opening.

Scald the milk. Melt the butter in a saucepan, add the flour, and gradually stir in the scalded milk. Cook thoroughly, then add the soft parts of clams and the juice. Season with salt and pepper and serve hot.

Calories, 300: protein, 22 grams; fat, 16 grams; carbohydrate, 17 grams.

CLAM WATER

To ¾ cup of cold water, add enough clam juice to make the desired strength. Serve hot, cold, or frozen.

Or, if milk is desirable, mix ¼ cup of clam broth with ½ cup of hot water and 1 tablespoon of milk. Season with pepper and ⅛ teaspoon of butter and serve hot. Omit the pepper and butter if necessary.

STEAMED CLAMS

Scrub the clams thoroughly with a vegetable brush and wash under running water. Put into a kettle, allowing ¼ cup of water to 1 quart of clams. Cover closely and steam until the clams partly open. Take care not to overcook them. Serve with melted butter and a few drops of lemon juice if desired.

OYSTERS

Oysters are a valuable food for invalids and convalescents. Besides the protein, they are rich in iron and copper. They have fairly liberal amounts of vitamin A and calcium; they are a good source of riboflavin; and they have an appreciable amount of vitamin D. They are easily digested and have a delicate flavor which appeals to most palates. They are in season from September to April. Make every effort to have the oysters fresh. Serious effects may result from eating spoiled oysters.

Composition Oysters removed from the shell and reckoned as solids are composed of 9.8 per cent protein, 2.0 per cent fat, 5.9 per cent carbohydrate, and 80.3 per cent water.[4] The carbohydrate is in the form of glycogen, being found in the liver, which constitutes a large part of the oyster. The composition of oysters is as follows:

QUANTITY	PROTEIN (*grams*)	FAT (*grams*)	CARBO-HYDRATES (*grams*)	CALORIES
30 grams (2 medium)	2.9	0.6	1.8	24
100 grams (7 medium)	9.8	2.0	5.9	81
1 cup (8½ oz.)	25.0	5.1	14.0	207

Digestibility The soft part of the oyster is easily digested when broiled, roasted, stewed, pan-broiled, or steamed. Fried oysters should not be served to the sick.

The hard part of shellfish is the muscle which fastens the animal to the shell. All forms of cooking make this muscle tougher; hence oysters are more easily digested when served raw or slightly broiled in the shell. They can best be digested in these forms by fever patients and those suffering from many forms of gastric disorder.

In acute illness, serve only the soft part of the oyster; but in the later stages of convalescence the whole oyster may be served raw or in stew or soup. These latter are recommended for their liquid form and their warmth.

[4] Based on Charlotte Chatfield and Georgian Adams, *Proximate Composition of American Food Materials,* U. S. Dept. of Agriculture Circular No. 549, Washington, D. C., 1940.

Principles of cookery The general rule is to remove the oyster from the heat as soon as it grows plump and the edges curl. An oyster cooked beyond this stage is overcooked.

OYSTER COCKTAIL

Scrub the shells with a vegetable brush under running water. Break the thin edges of the shell with a hammer so a knife can be inserted to cut the muscle holding the two parts of the shell together. When the muscle is cut, remove the upper half of the shell and wipe the edges free from sand. Then cut the muscle which holds the oyster to the other half of the shell so it can be lifted out easily.

Arrange 6 oysters on a soup plate filled with crushed ice. Serve with salt, pepper, and lemon juice, or with cocktail sauce or horse-radish.

BROILED OYSTERS

(Individual rule)

4 large oysters	¼ cup cracker crumbs
4 tsp. butter	Salt and pepper

Wash, drain, and dry the oysters. Melt the butter. Season the cracker crumbs with salt and pepper. With a silver fork lift each oyster by the tough muscle and dip first in butter, then in crumbs. Place on a buttered broiler and broil 2 inches from the heat until the edges curl and the oysters plump up. Serve plain, garnished with parsley and a piece of lemon, or make cream toast sprinkled with finely chopped parsley and put the broiled oysters on top.

Calories, 338: protein, 11 grams; fat, 21 grams; carbohydrate, 26 grams.

CREAMED OYSTERS

(Individual rule)

8 oysters	Salt
1 tbsp. butter	White pepper.
1¼ tbsp. flour	½ cup rich milk or thin cream

Wash, drain, and dry the oysters. Melt the butter and add the flour. Remove from the fire and gradually add the milk, scalded. Season with salt and pepper and cook thoroughly. Add the oysters and heat until the edges curl and the bodies plump up. Serve at once on rounds of toast or in bread cases (page 562, under Creamed Fish).

Calories,[5] 319: protein, 17 grams; fat, 19 grams; carbohydrate, 20 grams.

[5] Calculated with whole milk.

OYSTER SOUP
(Individual rule)

½ cup milk
1 tbsp. butter
¾ tbsp. flour
Grating of mace
Bit of onion
½ cup oysters
¼ cup water
Salt and pepper

Scald the milk. Melt the butter, add the flour, and gradually stir in the scalded milk. Add the onion and mace and cook thoroughly, stirring constantly.

Put the oysters in a strainer over a bowl. Pour the water over them and pick over oysters to remove bits of shell. Heat the liquor drained from the oysters and strain through two thicknesses of cheesecloth and add to the cream sauce. Add the oysters and cook until the edges curl and the bodies plump up. Season and serve at once.

Calories, 315: protein, 17 grams; fat, 20 grams; carbohydrate, 17 grams.

SCALLOPED OYSTERS
(Individual rule)

½ cup oysters
¼ cup cracker crumbs
⅛ cup bread crumbs
1 tbsp. melted butter
½ tbsp. thin cream
1 tbsp. oyster liquor
Salt and pepper

Wash the oysters as described above under Oyster Soup. Stir the crumbs into the melted butter until all the crumbs are coated. Butter a small baking dish and put in a layer of crumbs. Put in half the oysters and sprinkle with salt and pepper, then another layer of crumbs. Pour over the cream and oyster liquor, then repeat the process with the rest of the oysters. Finish with a layer of crumbs on top. Bake in a hot oven about 10 minutes, till the oysters are plump and the crumbs brown. Serve hot.

More than two layers of oysters will not cook evenly. Add a sprinkling of mace or nutmeg if desired.

Calories, 400: protein, 17 grams; fat, 20 grams; carbohydrate, 41 grams.

35.
FRUITS AND NUTS

Fruits are the fleshy, seed-bearing portions of plants. Some products of this class, such as melons and tomatoes, are sometimes called fruits and sometimes vegetables; while a few vegetable products which are not fruits in the strict sense are included as fruits because they have a similar place in the diet.

Composition Fresh fruits contain a high percentage of water, from 75 per cent to over 95 per cent. When the water is removed by drying, the percentage of moisture falls to 20 per cent or less, and the proportion of most nutrients is correspondingly raised. The fuel value of preserved fruits is raised by the addition of sugar and usually by some loss of water in the process of preparation.

The amount of protein in fruit is so small as to be negligible, and with few exceptions fruits contain little or no fat. There is, however, a rather high percentage of carbohydrate, usually in the form of sugar, although starch is found in unripe fruit, especially bananas. The sugars are chiefly sucrose, or cane sugar; dextrose, or grape sugar; and levulose, or fruit sugar. Invert sugar, a mixture of dextrose and levulose, is also found. Pectin, a complex water-soluble carbohydrate, is also found in fruit and forms the basis of jellies.

Fruits as a class are an important source of mineral matter. Some of them—notably prunes, raisins, and figs—are rich in iron. Fruits also contain characteristic organic acids, such as *malic* acid in apples, *citric* acid in citrus fruits, etc.

The flavor of fruits is due partly to the sugars and acids they contain, and partly to characteristic ethereal substances present in small quantities. Chemists have isolated the oils and ethers which give the peculiar flavor to bananas, strawberries, and other fruits.

Nutritive value Fresh fruits are an important item in the diet of every individual, sick or well (1) because they supply mineral matter and vitamins, especially ascorbic acid, orange and tomato juice being

very rich; (2) because of their laxative effect due to the cellulose and organic acids they contain; and (3) because when absorbed in the body they yield an alkaline residue which neutralizes the acid residue formed by cereal, meat, eggs, and other protein-rich food. This "maintenance of neutrality" is one of the properties of food included as a regulatory function. Fresh fruits are useful also for their refreshing, appetizing qualities. The composition of fruits is as follows:

Preventing discoloration Orange juice or salted water—or vitamin C dissolved in water—will prevent pears, apples, and bananas from turning brown.

FRUIT, 100 GRAMS	PROTEIN (*grams*)	FAT (*grams*)	CARBO-HYDRATE (*grams*)	ENERGY VALUE (*calories*)
Apples	0.3	0.4	14.9	64
Apricots	1.0	0.1	12.9	56
Bananas	1.2	0.2	23.0	99
Blackberries	1.2	1.1	11.9	62
Blueberries	0.6	0.6	15.1	68
Cherries	1.1	0.5	14.8	68
Cranberries	0.4	0.7	11.3	53
Currants	1.6	0.4	12.7	61
Grapes, American type	1.4	1.4	14.9	78
Huckleberries	0.6	0.6	15.1	68
Lemons	0.9	0.6	8.7	44
Muskmelon	0.6	0.2	5.9	28
Olives, green, pickled	1.5	13.5	4.0	144
Oranges	0.9	0.2	11.2	50
Peaches	0.5	0.1	12.0	51
Pears	0.7	0.4	15.8	70
Persimmons	0.8	0.4	33.5	141
Plums	0.7	0.2	12.9	56
Prunes	0.9	0.2	21.8	93
Raspberries	1.1	0.6	14.4	67
Strawberries	0.8	0.6	8.1	41
Tomatoes	1.0	0.3	4.0	23
Watermelon	0.5	0.2	6.9	31

APPLESAUCE

Wash, core, and slice apples and cook until tender, using a small amount of water. When tender put through colander or mill and season with sugar, and if desired cinnamon or nutmeg.

BAKED APPLES

Wipe and core apples and put into a shallow dish with 1 tablespoon of water to each apple. More may be added during cooking if necessary. Put 1 tablespoon sugar into the center of each apple. Bake in a hot oven 20 or 30 minutes, or until soft, basting with the syrup every 10 minutes. A little nutmeg may be added to the sugar and a few drops of lemon juice to each apple. Care must be taken that apples do not break and lose their shape.

CUBAN APPLES

Pare and core sound, tart apples. Steam until almost tender, remove to a buttered pan, fill the cavities with coconut, stick the apples full of blanched almonds, and baste with a syrup made of sugar, water, and lemon juice. Finish cooking in a hot oven, basting often. When serving, fill the cavities with jelly or the jellied juice.

STEWED APPLES

Wash, pare, core, and slice apples, put into a saucepan and add 1 teaspoon sugar for each apple and enough boiling water to cover partly. Cover the saucepan and cook slowly without stirring until the apples are transparent and tender. Pears and peaches may be cooked in the same way.

APRICOT AND PRUNE SAUCE

¼ cup prunes	1 cup cold water
¼ cup dried apricots	Sugar to taste

Wash the fruit carefully and soak overnight in the cold water. In the morning simmer slowly for 1 hour, or until tender. The fruit will need very little sugar, as the sugar in the fruit is developed by this method of cooking.

Calories without sugar, 260: protein, 4 grams; carbohydrate, 60 grams.

BAKED BANANAS

Cut bananas in halves, put into a shallow pan, sprinkle with sugar and a little lemon juice, and bake until soft.

CRANBERRY SAUCE OR JELLY

1 cup cranberries	½ cup water
⅓ cup sugar	

Pick over and wash cranberries. Put into a saucepan, add sugar and

water, bring to the boiling point, and boil 15 minutes. Strain and cool.

For jelly use ½ cup sugar and ¼ cup water and after straining put into molds.

Sauce—Calories, 360: protein, 1 gram; fat, 1 gram; carbohydrate, 87 grams.

Jelly—Calories, 500: protein, 1 gram; fat, 1 gram; carbohydrate, 122 grams.

DATE BONBONS

Cut open the dates and remove the stones. Put salted almonds or fourths of English walnuts inside. Roll in powdered or granulated sugar and serve.

DATE SAUCE

Prepare apples as for stewing and partially cook. Add equal quantity of stoned dates and sugar to taste. Cook until dates are tender. Serve either hot or cold.

DATE AND FIG BONBONS

1 pound prunes or raisins	1 pound dates
1 pound figs	Nuts if desired

Stone the fruit and put all through a meat chopper. Serve in a small fancy covered dish or make into balls and roll in powdered sugar.

These are delicious and form an excellent laxative for children or adults. To increase the laxative effect, add 1 ounce of senna leaves and give in doses of 1 to 2 teaspoonfuls night and morning.

Calories,[1] 4145: protein, 39 grams; fat, 11 grams; carbohydrate, 974 grams.

STEWED FIGS

½ pound figs	1 cup cold water
¼ cup white sugar	Juice of ½ lemon

Wash the figs and cut into small pieces. Dissolve the sugar in the water. Add the figs and bring slowly to the boiling point and cook very slowly so as not to add more water for 2½ hours. When tender, add the lemon juice.

Calories, 890: protein, 9 grams; fat, 3 grams; carbohydrate, 207 grams.

BAKED LEMON OR ORANGE

Bake a lemon or a sour orange in a moderate oven for 20 minutes. When done, open at one end, take out the inside, and sweeten with sugar or molasses. Excellent for hoarseness.

[1] Calculated with dried prunes, figs, pitted dates, no nuts.

STEWED PRUNES

Wash the prunes, cover with clear, cold water and allow to stand over night. In the morning simmer slowly for about 1 hour, or until tender when pierced with a fork.

No sugar is needed as prunes are 42 per cent sugar and cooked in this manner are very sweet. The simmering process renders them rich and juicy, while boiling toughens the skin. A little lemon juice or orange rind is a pleasant addition.

Prunes are a valuable nutrient, and their use as a laxative is scarcely second to figs. To increase the laxative effect, add 1 ounce of senna leaves to 1 pound of fruit, all prunes or part figs.

12 prunes, 50/60s—Calories, 299: protein, 2 grams; fat, 1 gram; carbohydrate, 71 grams.

STEAMED RHUBARB

(2 servings)

1 cup rhubarb (4 oz.)	¼ to ½ cup sugar

Wash the rhubarb and cut it into inch pieces without removing the skin. Put it into the top of a double boiler and steam over hot water ½ hour or until soft. Do not stir, as it breaks the pieces. Sweeten to taste immediately on taking from fire. If rhubarb cooks a minute too long—which means after it has gone to pieces—it loses its delicious flavor.

Calories,[2] 300: protein, 1 gram; carbohydrate, 74 grams.

FRUIT PULP FOR INFANTS (Holt)

Dried apples, apricots, peaches, or prunes may be prepared as follows: Soak the dried fruit overnight in enough water to cover. In the morning simmer slowly for 1 hour, until the flesh is tender when pierced with a fork. Remove all skins by pressing through a fine wire sieve or a fruit press.

DATES FOR YOUNG CHILDREN

Wash the dates and soak in water to cover for 15 minutes. Then remove and dry, take off the outer skin and remove the pits. Put through a meat chopper and add 2 teaspoons of orange juice for each cup of dates. This is good on toast or crackers and is very nourishing.

[2] Calculated with ⅓ cup sugar; calories from rhubarb, 20.

NUTS

"Nut" commonly means a kernel or meat enclosed in a hard shell. Nuts are used very little in diet for invalids, but a word about them is not out of place because when they are allowed they may be used advantageously to increase the attractiveness of certain dishes as well as their nutritive value.

Composition Nuts contain chiefly protein and fat, and little water in contrast to fruits. Nuts are most advantageously used along with bulky foods such as fruits and vegetables; and those lacking in fat, such as bread. In a vegetarian diet they are a valuable source of protein. They furnish protein similar to that of meat, but they are not a significant source because ordinarily few calories are eaten. The same is true of the minerals they contain. Nuts are poor in vitamin A and ascorbic acid, but they are a fair source of thiamine.

Nutritive value Nuts are a concentrated food, their high fuel value being due to their high content of fat and their low content of water. Their composition is as follows:

30-GRAM PORTIONS	PROTEIN (*grams*)	FAT (*grams*)	CARBO-HYDRATE (*grams*)	ENERGY VALUE (*calories*)
Almonds	5.6	16.2	5.9	192
Brazil nuts	4.3	19.8	3.3	209
Filberts	3.9	18.2	5.4	201
Hickory nuts	4.2	20.2	4.0	215
Peanuts, Virginia type	8.1	13.3	7.1	180
Walnuts, English	4.5	19.3	4.7	211

Digestibility Nuts are commonly regarded as hard to digest. This is due largely to improper mastication or other preparation for digestion. To insure the best utilization of nuts, they must be thoroughly ground or masticated. Nut butters offer much less resistance to digestion than raw nuts hastily eaten.

Cooking nuts Nuts are more often eaten raw than cooked. The peanut, however, is not palatable in the raw state, and the chestnut is indigestible unless the starch is cooked. Almonds and walnuts are widely used in confectionary and baking.

Nuts may be used as staple articles of diet in salads, soups, desserts, and so forth. Nut flours and meals are made into bread or porridge. Almond meal, which contains no starch and very little sugar, is often used in bread for diabetics.

36. MEAT

The term meat properly includes the flesh of all animals used for food. It commonly means beef, veal, mutton, lamb, and pork; and is sometimes extended to include poultry and game.

Composition

1. Muscle fibers, composed of proteins, extractives, inorganic salts, vitamins and water. The principal protein is albumin. Muscle albumin is often called myosin.
2. Nitrogeneous extractives, including creatin, creatinin, and purins.
3. Inorganic salts, chiefly those of potassium, sodium, magnesium, phosphorus, chlorine, sulphur, and iron. The greater part of the iron is in combination with the hemoglobin of the red blood corpuscles.
4. Connective tissue, which binds together the muscle fibers. This consists chiefly of a protein called collagen, which yields gelatin on boiling.
5. Fat interspersed between the fibers.

The notable constituent of meat is protein. The fat content of meat varies with the cut and kind and the condition of the animal from which it was taken. In general meat contains little or no carbohydrates. The composition of muscle meats is as follows:

100-GRAM PORTIONS	PROTEIN (*grams*)	FAT (*grams*)	CARBO-HYDRATE (*grams*)	ENERGY VALUE (*calories*)
Beef, lean, raw	19.3	13.0	0	194
Ham, fresh, lean, raw	17.2	22.0	0	267
Ham, smoked, lean, raw	19.5	25.0	0.3	304
Lamb, raw	18.0	17.5	0	230
Mutton, raw	18.0	17.5	0	230
Pork, lean, raw	17.9	18.0	0	234
Veal, raw	19.1	12.2	0	186

Nutritive value Meat is rich in valuable proteins and also more or less rich in fat. The proteins are important because they supply the essential amino acids in more or less satisfactory proportions, but they are not superior to the proteins of milk and eggs. Meat furnishes considerable iron and a moderate amount of phosphorus, but is very poor in calcium. The nitrogenous extractives present have no nutritive value but give to meat its characteristic flavor and odor and act as stimulants to the secretion of gastric juice.

Meats are important sources of the vitamins. Muscle meats contain thiamine, are an excellent source of riboflavin, and contain important amounts of niacin. Several organ meats, especially liver, are rich in vitamin A. Liver is also a very rich source of riboflavin, niacin, and other of the less well-known vitamins.

Digestibility When properly cooked, meat is easily digested and the products at digestion are readily absorbed. The extractives probably aid to some extent by stimulating the flow of gastric juice. The rate of digestion depends upon the amount of fat present. The residue left in the intestines from the digestion of practically all meats is very small—on the average not more than 3 per cent.

Quality The quality of meat depends upon the age, environment, care, and feeding of the animal and the time of hanging after slaughtering. It also depends to a large extent upon the cuts used. The tougher and less expensive cuts, if properly cooked, are as nutritious and as easily digested as the expensive cuts. However, tough meat takes long, slow cooking to make it palatable and tender, and the fuel used must be taken into consideration in estimating the expense.

The tougher cuts come from the legs, especially the lower part, and the neck, the muscles which get the most use. They are more highly flavored because of the freer circulation of blood through these portions. Cuts from the neck and shin are used for soups and broths.

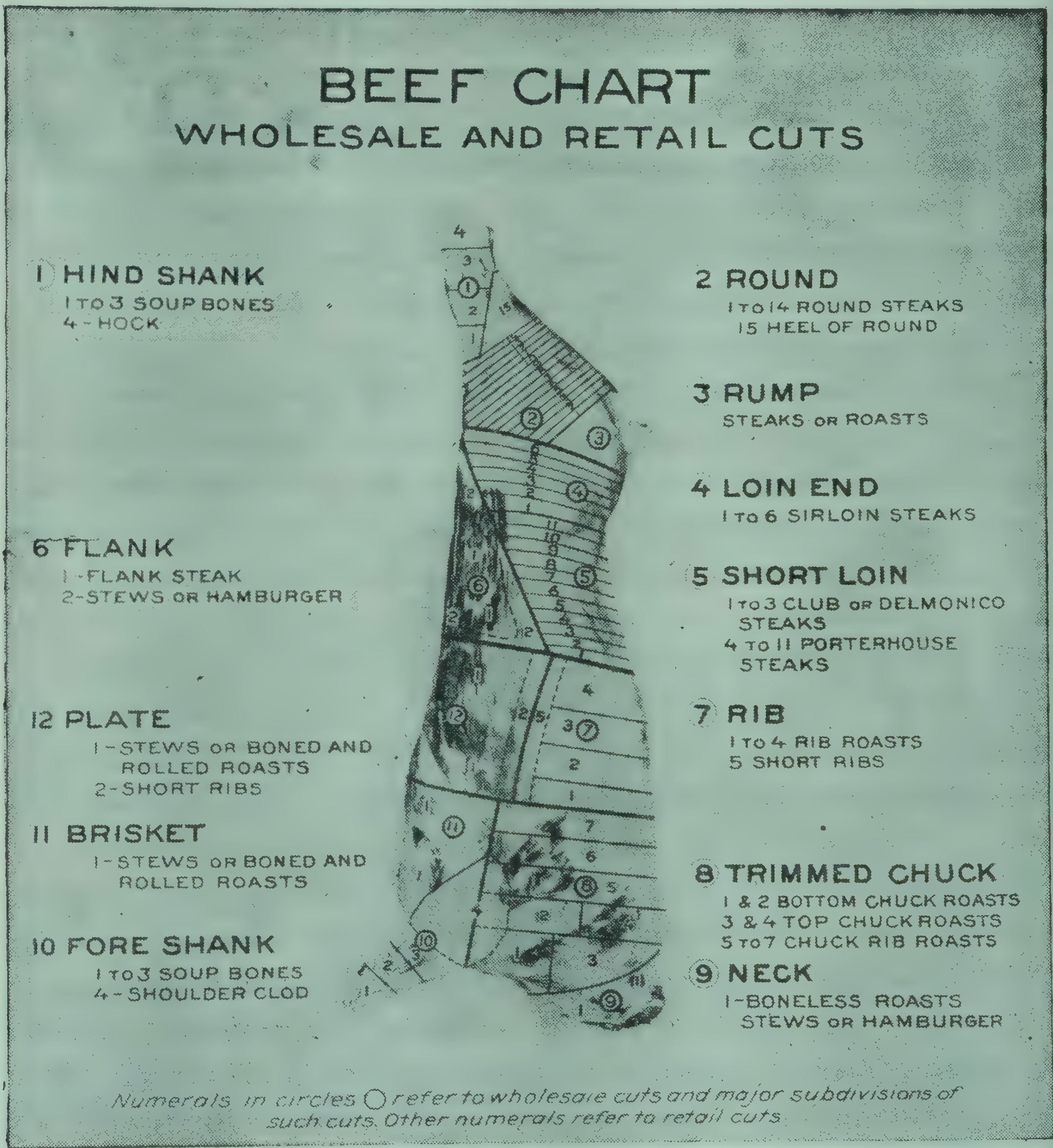
The more tender, and likewise more expensive, cuts come from the upper portion of the hindquarter and the foreribs. They are used for steaks and roasts. They are no more nutritious than the cheaper cuts.

The flank, the shoulder, and the brisket—the remaining muscular portions—are not as tender as the upper part of the hindquarter, but are fully as nutritious. They require longer cooking and are used for stews, braising, and pot roasts.

BEEF

The best beef is obtained from a steer 3 or 4 years old which has been fattened on the proper food. The carcass should hang for two or three weeks after slaughtering.

Test for good beef Good beef is light to medium red in color, fine grained, and of firm texture. The meat is well mottled or marbled with creamy-white fat, and there is a good outer covering of the same kind of fat. The surface of the meat is smooth and velvety in appearance.



Courtesy, War Food Administration, U.S. Department of Agriculture

BEEF PREPARATIONS

Beef juice Beef juice obtained by pressing the juice from ground steak contains salts and extractives and some proteins. It has little food value, but is readily absorbed and is useful where the appetite stimulating effect of the extractives is desired.

One pound of meat yields about 4 ounces of juice. In serving beef juice, great care should be taken when reheating, that it is not heated above 120° to 135° F., at which temperature albumin coagulates in flakes.

Beef tea Beef tea, a water extract of ground steak, consists chiefly of nitrogenous extractives, mineral salts, and water. It contains almost no protein, the amount in even a strong tea being less than 2 per cent. It is used for its appetizing flavor and its stimulating qualities rather than as a food.

Raw beef Raw beef, when scraped or finely minced, is readily digested. Its somewhat unappetizing flavor and color may be disguised in many ways, or it may be very slightly cooked.

Comparisons Beef juice is much richer in protein than beef tea, but less appetizing. A small amount of beef tea added to beef juice makes a preparation which has both flavor and nourishment. Raw beef, since it contains all the nutriment of the beef, is of course more nourishing than either beef juice or beef tea, or the combination of them.

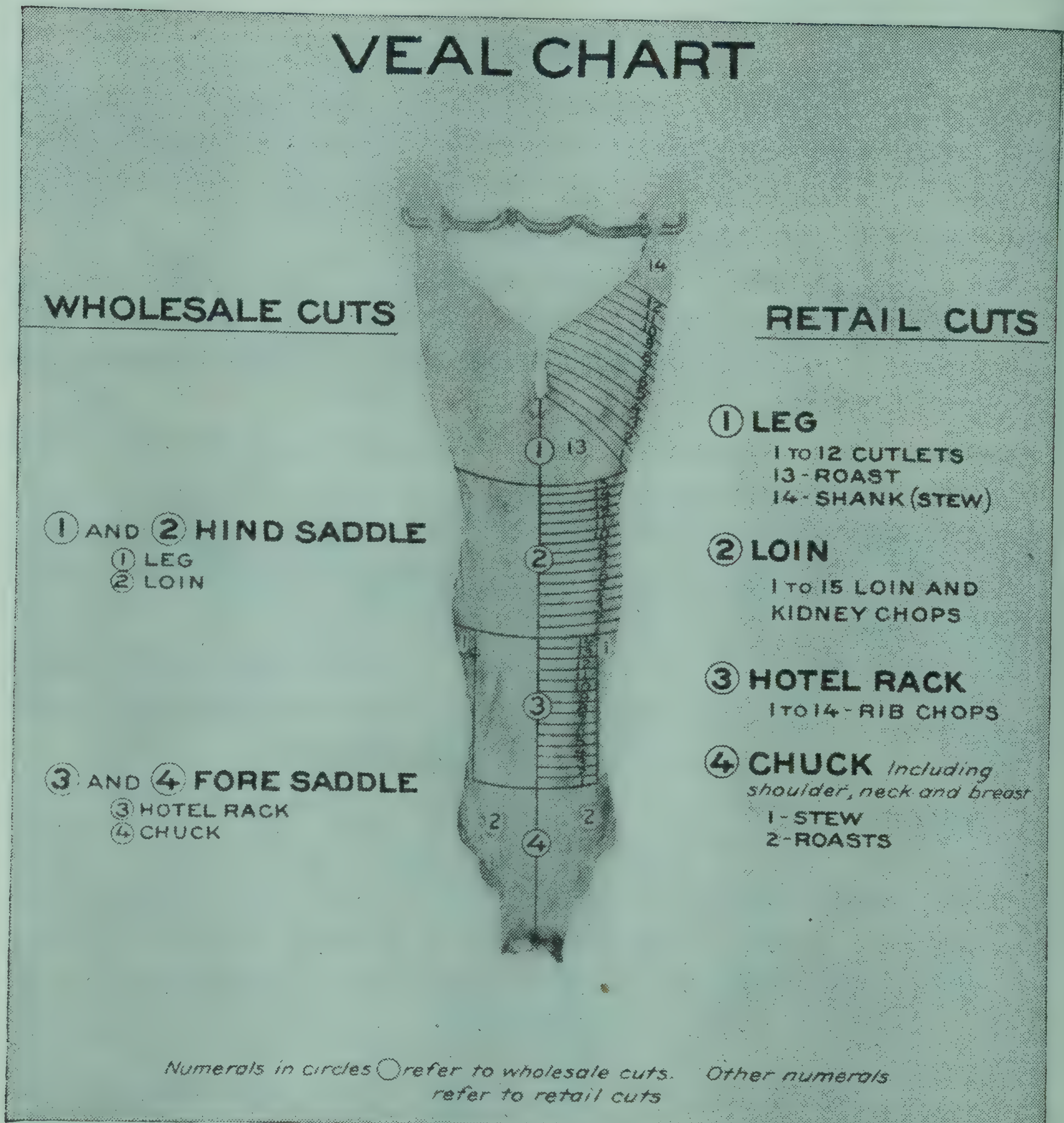
VEAL

Formerly veal was considered hard to digest, but recent experiment has shown that young veal is digested as easily as beef. The best veal comes from milk-fed calves 6 to 8 weeks old; but veal even a few days old has no injurious effects.

Principles of cookery Veal lacks fat, hence fat may be added in cooking. It also requires more seasoning than other meats. Veal should be thoroughly cooked in order to soften its large amount of connective tissue and collagen.

Braising, stewing, and roasting are the most suitable methods of cooking veal.

Test for good veal Good veal is pinkish, with firm white fat, finegrained and tender.



Courtesy, War Food Administration, U.S. Department of Agriculture

LAMB AND MUTTON

Lamb is the meat of the young sheep. "Spring lamb," usually marketed in the spring, comes from milk-fed lambs three to five months old.

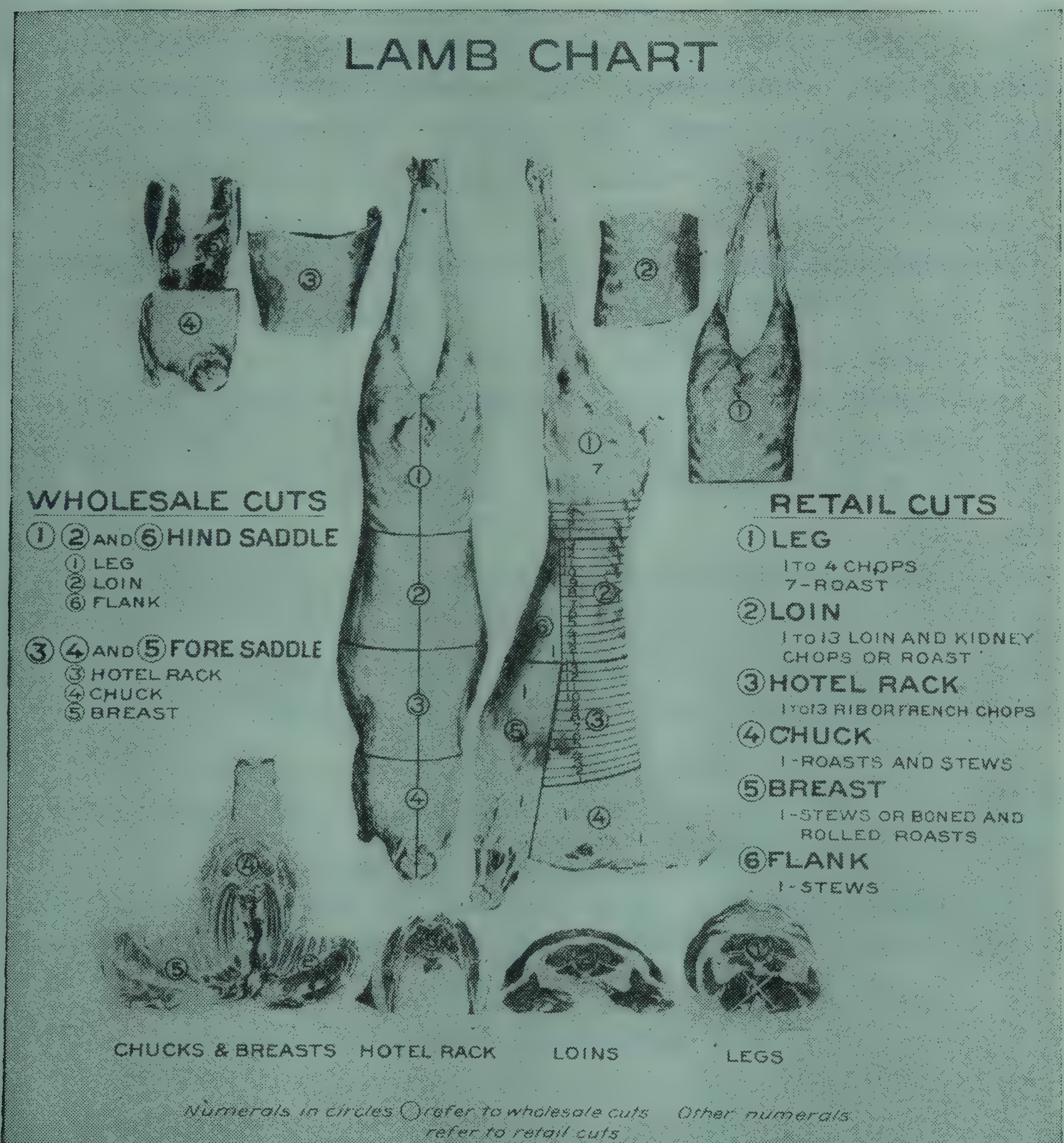
Mutton is the meat of the mature sheep, being best when the sheep is from eight to twelve months old.

Test for good lamb Good lamb has a rich pinkish-red color. The meat is fine-grained, firm, and velvety in texture. A fair covering and some mottling or marbling of fat insures a good flavor. The bone of young lamb is porous and red. The forefoot ankle joint is jagged or

uneven, showing that the bone was sufficiently porous to break the forefoot joint. This is known as the "break point" and is found only in lamb.

Test for good mutton Good mutton is grayish or brick-red in color. It is fine-grained, firmer than lamb, and has a rather thick outer covering of brittle white fat. The bones are larger than in the lamb and are very white and flintlike. The forefoot joint is smooth and dry, showing that the forefoot was removed at the joint proper.

The forequarter or neck, shoulder, and breast cuts of both lamb and mutton are high in flavor. They make delicious boned and rolled steam roasts, pot roasts, or cuts for braising, casseroling, or steaming.



Courtesy, War Food Administration, U.S. Department of Agriculture

PORK

The flesh of the pig is the least digestible of all meats on account of the high percentage of fat which it contains. Consequently it is not used in cookery for the sick, with the exception of an occasional small amount of ham, salt pork, or bacon, the salty taste of which occasionally acts as a stimulant to the lost appetite of the convalescent.

Bacon is more easily digested than other cuts of pork. Next to butter and cream, bacon is the most easily assimilated of ordinary food fats.

ORGAN MEATS

The internal organs used as food include the heart, brain, kidneys, liver, pancreas, thymus glands, and stomach. The tongue may also be included with these meats. Although some are as easily digested as most muscle tissue, most of them produce large quantities of uric acid in the body.

The **heart** and **kidneys** are not as easily masticated and digested as other meats on account of their close, firm texture, and should be eaten only by those with good digestive powers.

The **brain** is easily digested. The **liver** is easily digested when properly cooked so as not to harden the protein. The liver is a very valuable food since it is an excellent source of several vitamins and is very rich in iron.

Tripe consists of the walls of the stomach of a ruminant, usually the ox. That coming from the paunch, or first stomach, is called "plain tripe"; and that from the reticulum, or second stomach, is "honeycomb tripe." When properly cooked, tripe is easily digested.

The **pancreas** and **thymus glands** of the calf or lamb are known as sweetbreads. They are most easily digested, but give rise to considerable uric acid in the body.

The **tongue** is not very easily digested; for, although the lean meat is tender, the fat is hard and tends to retard digestion in the stomach.

COOKING MEAT

The principal constituents of meat to be considered in cooking are the heat-coagulable albumin and the connective tissue.

The objective points in the different methods of cooking may be

summarized as follows: (1) to retain the juice as in baking, broiling, boiling, and frying; (2) to extract the juice as in soup making; and (3) to extract and retain the juice as in the preparation of stews.

In cooking, meat loses weight from the separation of water, which contains salts and nitrogenous extractives. This process continues as the temperature rises, except that coagulable proteins no longer separate with the water.

The coagulation of albumin by heat is a property that is made use of in cooking meat. Searing the outer surface of meat coagulates the albumin and gives a coating that prevents loss of the juices.

Connective tissue is hardened and toughened by dry heat and high temperature. Cooking at low temperatures in moist heat softens the tissue and converts it into a gelatinous mass.

Heat penetrates meat slowly. At a temperature of approximately 158° F. the meat assumes a gray color as a result of the decomposition of the coloring matter of the blood. At the same time a peculiar odor of cooking develops, due to chemical changes produced by the heat.

Broiling In broiling, the meat is to be cooked in its own juices; therefore these must be retained as completely as possible. At first the temperature should be sufficiently high quickly to coagulate and even to harden the albumin on the outside surface, so as to form a layer or protecting coat over the whole; then the heat should be modified so that the interior will be raised to a temperature that will cook it properly without loss of its nutritive properties.

The time of broiling varies with different meats, beef and mutton requiring less time than lamb, chicken, or game. Meat properly broiled swells and when cut exudes the juice readily. If cooked too long, the inner albumin coagulates, the meat loses its moisture, shrinks, and becomes tough.

Effect of hot and cold water Cold water draws out the soluble albumin, the extractives, and some of the salts and flavor. Thus in soups, broths, and stews, where all the nutriment possible is desired in the liquid, the meat is first put into cold water and gradually brought to a higher temperature.

Hot water coagulates the albumin; and, since too much heat toughens and makes this indigestible, the proper cooking temperature is important. It is often necessary to sacrifice a small amount of albumin by searing the outside of the meat in order to retain the juices more effectively, after which the connective tissue can be softened by gentle simmering for several hours.

TIMETABLE FOR BROILING [1]

CUT	WEIGHT	APPROXIMATE COOKING TIME	
		Rare	Medium
	Pounds	*Minutes*	*Minutes*
BEEF			
Chuck steak—1 inch	2⅓	24	30
1½ inches	4	40	45
Rib steak—1 inch	1½	15	20
1½ inches	2	25	30
2 inches	2¼	35	45
Club steak—1 inch	1	15	20
1½ inches	1¼	25	30
2 inches	1½	35	45
Sirloin steak—1 inch	3	20	25
1½ inches	4¼	30	35
2 inches	5¾	40	45
Porterhouse steak—1 inch	2	20	25
1½ inches	2½	30	35
2 inches	3	40	45
Ground beef patties 1 inch thick by 3 inches	4 ounces	15	25
LAMB			
Shoulder chops—1 inch	3 ounces	Lamb chops are not served rare	12
1½ inches	6 ounces		18
2 inches	10 ounces		22
Rib chops—1 inch	2 ounces		12
1½ inches	4 ounces		18
2 inches	5 ounces		22
Loin chops—1 inch	3 ounces		12
1½ inches	5 ounces		18
2 inches	6 ounces		22
Ground lamb patties 1 inch by 3 inches	4 ounces		18
PORK			
Ham slice ½ inch	¾-1	Ham always cooked well done	20 (well done)
1 inch	1½-2		25-30
Ham slice—tendered ½ inch	¾-1		10-12
1 inch	1½-2		16-20
Bacon			4-5

[1] This time-table is based on broiling at a moderate temperature (350° F.). Rare steaks are broiled to an internal temperature of 130° F.; medium to 160° F. Lamb chops are broiled to 170° F. Ham is cooked well done. The time for broiling bacon is influenced by personal preference as to crispness.

Prepared by the Livestock and Meat Board. Reprinted by permission.

BROILED MEATS

BROILED BACON

Use thin slices with the rind removed. Broil with a high heat. The fatty tissue first becomes translucent, then white, and finally brown. Bacon should be cooked at least until the white stage is reached; most people prefer it a delicate brown.

Care should be taken not to overheat so that the fat smokes while cooking.

PAN-BROILED BEEF CAKES

Shape ground meat into cakes. Heat a frying pan very hot, greasing slightly if the meat lacks fat. Put the cakes into the pan and turn every 10 seconds, pouring off any fat that appears in the pan. Season and serve hot.

PAN-BROILED CHOPS

Heat the pan very hot, using no fat. Turn the chops every 10 seconds until seared, then finish cooking with reduced heat. Allow 5 to 7 minutes to cook. Season and serve.

BROILED HAM

Use slices of ham ⅓ inch thick. Slash the fat edges and broil 3-5 minutes, or until brown on both sides, turning frequently. Sliced boiled ham is very delicate cooked the same way, cooking it less time.

BROILED STEAK

Heat and grease the broiler, and preheat the broiling oven. Place the steak 3 inches from the heat and sear both sides, turning frequently. Then reduce the heat and finish broiling, turning occasionally. If the juice runs freely when the steak is cut, it is done. For rare or medium steak allow:

1-inch steak	5-10 minutes
1½-inch steak	10-15 minutes
2-inch steak	18-25 minutes

Sprinkle with salt and pepper, spread with butter, and serve on a hot platter.

BROILED LAMB OR MUTTON CHOPS

Follow the directions for Broiled Steak, allowing 5-8 minutes for chops 1 inch thick. Season and serve.

TIMETABLE FOR ROASTING [2]

ROAST	WEIGHT	OVEN TEMPERATURE CONSTANT	INTERIOR TEMPERATURE WHEN REMOVED FROM OVEN	APPROXIMATE TIME PER POUND
BEEF	*Pounds*	*Degrees F.*	*Degrees F.*	*Minutes*
Standing ribs	6-8	300	140 160 170	18-20 22-25 27-30
Standing ribs (1 rib)	1.8	350	140 160 170	33 45 50
Rolled ribs	6-8	300	140 160 170	32 38 48
Chuck ribs	5-8	300	150-170	25-30
Rump (high quality)	5-7	300	150-170	25-30
PORK—FRESH				
Loin—Center	3-4	350	185	35-40
Whole	12-15		185	15-20
Ends	3-4		185	45-50
Shoulder—Whole	12-14	350	185	30-35
Boned and rolled	4-6	350	185	40-45
Cushion	4-6	350	185	35-40
Pork butt	4-6	350	185	45-50
Fresh ham	10-12	350	185	30-35
PORK—SMOKED				
Ham—Whole	10-12	300	170	25
Tendered	10-12	300	160	15
Half	6	300	170	30
Tendered	6	300	160	20
Shank end	3	300	170	40
Butt end	3	300	170	45
Cottage butt	2-4	300	170	35
Picnic	3-10	300	170	35
LAMB				
Leg	6½-7½	300	175-180	30-35
Shoulder—Rolled	3-4	300	175-180	40-45
Shoulder	4½-5½	300	175-180	30-35
Cushion	3-4	300	175-180	30-35
VEAL				
Leg roast	7-8	300	170	25
Loin	4½-5	300	170	30-35
Rack—4-6 ribs	2½-3	300	170	30-35
Shoulder	7	300	170	25
Shoulder—rolled	5	300	170	40-45

[2] Oven temperatures for the constant temperature method were selected because they give results comparable to the searing method in browning, amount of shrinkage, and in roasting time per pound. This table serves as a guide, therefore, in roasting by either method.

Prepared by the Livestock and Meat Board. Reprinted by permission.

FRENCH LAMB CHOPS

Trim away all but the round muscle meat and a little fat, leaving the bone bare, and broil. Season, garnish with parsley and peas, and serve hot with paper handles on the bones.

ROAST MEATS

Meat may be roasted at a constant temperature, or it may be seared first and the roasting completed at a lower temperature. There is less shrinkage when the constant-temperature method is used.

Let the meat stand at room temperature for about an hour before roasting. Place it fat side up in an open roasting pan. Do not add water. Roast according to the temperature chart on page 586.

Roast Meats—Searing method If the searing method is used, have the oven 450° for 10-15 minutes, then reduce to the temperatures given above and continue cooking for 15-20 minutes less than the total time required by the constant-temperature method (page 586).

ROAST MEAT GRAVY

¼ cup pan fat
¼ cup flour
2 cups boiling water
Salt and pepper

Pour off all but ¼ cup of the fat in the pan. Place the pan on top of the stove and add the flour gradually, stirring constantly. Stir until the flour is nicely browned, about 3 minutes. Add the boiling water slowly and boil until the gravy thickens. Season to taste.

Calories, 610: protein, 3 grams; fat, 57 grams; carbohydrate, 21 grams.

STEWS

BEEF STEW
(4 servings)

1 lb. rump beef
1 pint boiling water
1 onion, sliced
1 can or 2 cups strained tomatoes
Sweet or white potatoes
Salt and pepper to taste

Cut the beef in inch pieces and cook with the onion and tomato juice

in boiling water. Simmer for 2 hours. An hour before serving, add the potatoes cut in quarters and cook until tender.

Calories,[3] 1660: protein, 91 grams; fat, 101 grams; carbohydrate, 97 grams.

TIMETABLE FOR COOKING IN WATER

CUT	AVERAGE WEIGHT	APPROXIMATE TIME PER POUND
HAM	*Pounds*	*Minutes*
Large	12-14	20
Small	10-12	25
Half	6-8	30
HAM *		
Large	12-14	15
Small	10-12	20
Half	6-8	25
Picnic shoulder	4-8	45
Corned beef	4-6	40-50
Fresh beef	4-6	40-50

* Hams now on market which require shorter cooking period due to method of processing.

LAMB STEW
(6 servings)

1½ lb. shoulder lamb
1 quart boiling water
1 onion
1 lb. string beans
Salt to taste
White potatoes

Cut the meat into medium-sized pieces. Cook with the onion in boiling water for 2 hours. One hour before serving, add the string beans, broken into inch pieces. Allow to simmer 30 minutes, then add as many potatoes as desired, cut into inch pieces. Garnish with parsley and serve with pepper hash and Parker House rolls.

Calories,[4] 2585: protein, 125 grams; fat, 172 grams; carbohydrate, 134 grams.

[3] Calculated with 4 medium white potatoes and rump, 75% lean.
[4] Calculated with 6 medium potatoes and shoulder, 78% lean.

BEEF JUICE AND TEA

BEEF JUICE (Hot Process)

Sear 1 pound of lean round steak, ground, in a hot pan long enough to start the juices and press out the juice. Season with salt and serve either cold or hot.

BEEF JUICE (Cold Process)

Place 1 pound of lean round steak, ground, in a jar; add 6 ounces of cold water and a pinch of salt. Cover the jar and chill 5 or 6 hours, or overnight, shaking occasionally. Strain the juice through coarse muslin, season, and serve either hot or cold.

In heating beef juice, it should be placed in a container and surrounded by water instead of over a direct flame.

100 grams (3½ oz.), ½ cup, scant—Calories, 30: protein, 5 grams; fat, 1 gram.

BEEF TEA

½ lb. steak
1 cup cold water
Salt to taste

Wipe the steak, remove the fat, and cut in small pieces. Put into a glass fruit jar, add the cold water, and let stand for 15 minutes. Cover the jar tightly and place in a pan containing cold water. Allow the water to heat slowly to 150° F., and keep this temperature for 2 hours. Strain, cool, and remove fat. Reheat in hot water to 130° F., season, and serve in heated cups.

Beef tea may also be frozen to the consistency of a water ice and served.

SCRAPED BEEF OR MEAT PULP FOR INFANTS (Holt)

Place a piece of round or sirloin steak (no fat), ½ to 1 inch thick on a meat board and with a large, heavy mixing spoon scrape the soft part of either side, leaving the tough fibers. From ½ to 1 tablespoon may be given, well salted, to a child of 18 months. Scraping is much better than cutting the meat fine.

For use on a large scale, as in institutions, a Hamburg steak cutter may be employed.

Scraped beef for the adult may be shaped into small, round cakes ½ inch thick and broiled 2 minutes or cooked in a hot, dry frying pan, never in fat. A little salt and butter may be added if desired. Serve plain or on rounds of toast.

30 grams, 1 serving—Calories, 58: protein, 6 grams; fat, 4 grams.

SCRAPED BEEF SANDWICHES

1 oz. scraped beef 1 oz. bread (1 slice)

Prepare the meat as for scraped beef, season and spread on bread cut very thin. Put slices on top, sandwich fashion, and cut in fancy shapes. Serve plain or toasted daintily.

Calories, 136: protein, 8 grams; fat, 5 grams; carbohydrate, 16 grams.

MEAT BROTH

The chief constituents of broth are the extractives and the soluble mineral matter of meat and bone, together with some gelatin, the cheaper cuts of meat usually being employed for this purpose. The amount of broth obtained varies according to the material used and the mode of preparation.

Broth may be made from beef, mutton, lamb, or chicken. Rice, barley, eggs, or some other food material may be added if desired.

In making broth, the chief objective is to extract the greatest possible amount of nutriment and flavor from the meat. This is best done by cutting the meat into small pieces, soaking it in cold water before heating, and simmering long and slowly.

Meat jellies are condensed broths and offer an agreeable way of serving broth to an invalid. The composition of meat broth and foods which may be added is as follows:

100 GRAMS	APPROXIMATE MEASURE	PROTEIN (*grams*)	FAT (*grams*)	CARBO-HYDRATE (*grams*)	ENERGY VALUE (*calories*)
Beef broth	½ cup, scant	2	1	0	17
Beef juice	½ cup, scant	5	1	0	30
Bouillon	½ cup, scant	1	0	0	4
Clam bouillon	½ cup, scant	0	0	0	2
Consommé	½ cup, scant	1	0	0	4

	WEIGHT (*grams*)	PROTEIN (*grams*)	FAT (*grams*)	CARBO-HYDRATE (*grams*)	ENERGY VALUE (*calories*)
1 whole egg, average	50	6.4	5.8	0.4	79
1 egg white, average	28	3.0	0.0	0.2	13
1 egg yolk, average	16	2.6	5.1	0.1	57
1 tbsp. rice, raw	10	0.8	0.0	7.9	35
1 tbsp. barley flour	7	0.7	0.1	5.4	25
1 tbsp. soy flour	7	4.0	0.5	1.1	23

BEEF BROTH

1 lb. lean beef
2 or 3 cups water
½ tsp. salt

Cut the meat fine and soak the pieces in cold water for 2 or 3 hours. Add the salt and simmer 4 hours, adding more water if necessary. Strain and cool. When cold, remove the fat. Season and serve hot, or cold in the form of jelly.

BEEF JELLY

3 lb. solid meat from the shoulder or shin
3 lb. bone from same
4 quarts cold water
2 tsp. salt

Take off the dried skin and any soft or bloody portion. Cut the meat into small pieces and crack the bone. Place both in an earthen jar. Cover with the cold water. Set in slow oven and cook from 8 to 12 hours. Strain through a colander. Add salt to taste; cool quickly. When cold remove the fat. Serve cold as a jelly, or reheat in a double boiler.

CALVES'-FOOT JELLY

2 small calves' feet
½ small chicken
1½ quarts water
1 cup Rhine wine
1 lemon
½ stick cinnamon
1 egg white, whipped

Clean the calves' feet and chicken. Cut into small pieces, add water and cinnamon, and cook until the meat separates from the bones, skimming if necessary while cooking. Strain through cheesecloth; let cool and remove fat.

Add wine and lemon juice, also sugar to taste, if desired. Return to the fire and reduce the amount of broth one-half. Add egg white, well whipped, and boil 5 minutes. Strain into molds and let harden in a cold place.

CHICKEN BROTH

3½ lb. chicken
3 pints cold water
2 tbsp. rice
1 tsp. salt
Speck pepper

An old fowl, not too fat, is best for broth. Thoroughly clean the chicken, removing skin and fat; separate at the joints and wipe with a wet cloth. Put in kettle, add the cold water and let stand ½ hour. Heat very slowly and simmer 3 hours or until meat is tender. When half cooked skim

off fat and add the rice and seasonings and if desired, a small onion. When meat is tender, skim off fat again and strain. Season properly and serve hot. When possible, make broth the day before using, so that it may be thoroughly cooled and the fat removed easily. Reheat in a double boiler. The rice may be cooked and rubbed through strainer before adding to broth, or it may be omitted if desired.

CHICKEN JELLY

½ small chicken	1 tbsp. granulated gelatin
1½ quarts water	½ tsp. salt
¾ cup celery	¼ tsp. cayenne
Sprig parsley	1 egg white

Prepare chicken as for chicken broth and cut flesh and bone into small pieces. Put into saucepan with cold water and let stand 30 minutes. Add remaining ingredients, except gelatin and egg white, and cook until meat separates from the bones.

Strain, let cool, remove fat, return to fire and reduce to 1 pint. Add gelatin, which has soaked in ¼ cup cold water, and the egg white well whipped. Boil 5 minutes, strain into molds, and let harden in a cold place.

MUTTON BROTH

2 lb. lean mutton with bones	2 pinches salt
1 quart cold water	

Prepare as for Beef Broth.

VEAL BROTH

Use a cut from the loin or knuckle of veal and prepare as for Beef Broth.

SWEETBREADS

Sweetbreads are the pancreas and thymus glands of the calf. The pancreas is sometimes called the stomach sweetbread, and the thymus glands the neck or throat sweetbread. The latter is somewhat more easily digested than the former. Sweetbreads are objectionable in cases of gout or other uric-acid disorders, but this is no contraindication of their occasional use by invalids. The composition of sweetbreads is as follows: protein, 19.6 per cent; fat, 3.1 per cent.

Sweetbreads are always prepared for subsequent cooking by parboiling.

TO PARBOIL SWEETBREADS

Place the sweetbreads in cold water as soon as they come from the market and allow them to stand for 1 hour. Drain and place immediately in boiling salted water to cover, allowing ½ tablespoon each of salt and vinegar or lemon juice to each pair of sweetbreads. Simmer 20 minutes. Drain again, plunge into cold water to keep them white and firm, and leave them there until ready to use.

BROILED SWEETBREADS

Parboil and cut in half lengthwise. Sprinkle with salt and pepper, place on a greased fine-wire broiler, and broil 5 minutes. As soon as the sweetbread is heated, brush both sides with a little melted butter. Serve with creamed butter to which a little lemon juice has been added, or simply spread with soft butter.

CREAMED SWEETBREADS

(Individual rule)

½ tbsp. butter
½ tbsp. flour
¼ cup milk
⅓ cup sweetbreads

Melt the butter, add the flour, stir to a smooth paste, and add the milk. Cook thoroughly, stirring constantly, and season to taste. Add the parboiled sweetbreads cut in small pieces, reheat, and serve on toast, garnished with parsley.

SCALLOPED SWEETBREADS

Put creamed sweetbreads in a small baking dish, cover with cracker crumbs and dot with bits of butter, and bake until the crumbs are a golden brown.

FRICASSEED SWEETBREADS

(3 servings)

Parboil 1 sweetbread and cut into ½-inch pieces. Make a sauce of the following:

2 tsp. butter
1 tsp. flour
½ tsp. lemon juice
¾ cup hot strong chicken broth
¼ cup thin cream
Salt and pepper

Melt the butter, add the flour, allow it to simmer until a golden brown, then add the hot broth gradually, stirring constantly, and lastly add the

cream. Season with salt, pepper, and lemon juice. A speck of curry powder may be added if desired.

Put the cut sweetbread into the sauce, simmer 5 minutes, and serve on dry toast, garnished with parsley.

Calories,[5] 230: protein, 6 grams; fat, 21 grams; carbohydrate, 4 grams.

[5] Calculated without the sweetbreads.

37.
MILK AND MILK PRODUCTS

Cow's milk contains all the nutrients necessary to support life, in remarkably good proportions, and in easily assimilable forms. It is the basis of the infant's diet and is especially suitable for certain classes of invalids.

Composition Whole milk is composed of approximately 3.3 per cent protein, 4 per cent fat, 5 per cent carbohydrate, 0.7 per cent mineral matter, and 87 per cent water. These proportions vary according to the breed of cow and the feed. The protein is chiefly casein, a compound containing both phosphorus and sulphur. About one-fifth of the total protein is lactalbumin. The protein is precipitated or coagulated by acid, or in neutral solutions by rennet, the character of the curd depending largely on the relative proportions of casein and lactalbumin present. The only known carbohydrate is lactose, or milk sugar, which remains in the whey when the casein and fat are removed. The mineral matter consists of large amounts of calcium and phosphorus, together with a trace of iron.

The fat of milk varies widely in amount. It is found throughout the milk in globules, i.e., as an emulsion. On standing, most of the fat rises to the top in the form of cream. Several fats are present, chiefly stearin, palmitin, and olein, with smaller amounts of others, such as butyrin, which gives the characteristic flavor to butter.

Milk also contains most of the essential vitamins. The content of vitamin A varies with the feed of the cow. Although its thiamine content is reduced about 15 per cent by pasteurization pasteurized milk is a fairly rich source of that vitamin. The amount of vitamin C present is small. This is also reduced by pasteurization. The content of vitamin D in milk is small, but now frequently augmented. It is rich in riboflavin.

Nutritive value The nutritive value of milk, especially as food for children, can hardly be overestimated. Every normal child should have

at least a quart of milk a day, and every adult at least a pint. Milk is a valuable source of protein from infancy throughout the entire period of growth. The proteins of milk are of high biological value because they contain all the amino acids essential to good nutrition. Moreover, the protein of milk is less liable to putrefaction in the alimentary canal than meat proteins.

The fat of milk, being in an emulsified form, is more readily assimilated than the fats of meat and other similar foods. The carbohydrate of milk requires only transformation to single sugars in order to be perfectly utilized.

Milk contains all the different minerals necessary to normal nutrition. It is especially rich in calcium. Without milk the need for calcium cannot be met in the American dietary.

Many people do not appreciate the value of milk as a food. They think of it as a beverage rather than a food, when in fact a quart of milk is equivalent in fuel value to about 9 ounces of white bread, 1 pound of lean beef, or 9 eggs. It contains as much protein as a third of a pound of lean beef, and as much fat at 1½ ounces of butter, together with milk sugar and valuable mineral salts.

Milk is cheap compared to other foods and should be freely used. It can be flavored with cocoa or coffee or be combined with other materials in soups, sauces, custards and the like, or used in place of water in cooking cereals.

The value of skim milk should also be emphasized. In the skimming process the milk merely loses most of its fat; it retains the same amount of protein, carbohydrate, minerals, thiamine, and riboflavin as the whole milk. It is not as rich in flavor as whole milk, but used in combination with other foods it forms an inexpensive source of valuable nutriment. The composition of milk is as follows:

100-GRAM PORTIONS	PROTEIN (*grams*)	FAT (*grams*)	CARBOHYDRATE (*grams*)	ENERGY VALUE (*calories*)
Condensed, sweetened	8.1	8.4	54.8	327
Evaporated, unsweetened	7.0	7.9	9.9	139
Malted, powder	14.6	8.5	70.7	418
Skimmed	3.5	0.1	5.1	35
Whole	3.5	3.9	4.9	69

Bacteria in milk Milk, especially when warm, is an excellent medium for the growth of both beneficial and harmful bacteria; hence

the sanitary conditions of its production and marketing are matters of prime importance. Most cities and states regulate these conditions by stringent laws.

In general, all milk should be cooled immediately after milking and should be kept cold until it is used.

Pasteurization This is a process of heating milk to destroy pathogenic bacteria. The usual procedure is to heat the milk to a temperature 140° to 145° F., retain that temperature for a period of 20 to 30 minutes, and then rapidly cool to 45° F. or lower. The Department of Health of New York State requires that in pasteurization the milk be heated either to at least 143° F. and held at such a temperature for 30 minutes or more, or to 160° F. or more continuously for not less than 15 seconds, and then cooled to a temperature of 50° or lower.[1]

Most harmful bacteria and lactic acid bacteria are killed. Spores are not killed, however, and if the milk is not kept cold or is allowed to stand too long, putrefactive organisms develop. These putrefactive changes are very undesirable, so that the care of pasteurized milk is just as important as that of fresh milk. If carelessly handled, the fact that it does not sour readily is a menace to health rather than a benefit.

Commercial pasteurization is a cheap and effective means of preventing the spread of ordinary infectious diseases. The degree of heat specified does not materially change the flavor or the chemical composition of the milk. It does destroy the antiscorbutic property.[2]

Care of milk in the home Milk should be protected from contamination from the moment it is received in the home until it is used. It should be kept in the coldest part of the refrigerator in covered sterile containers, and should not be left uncovered at any time.

FORMS OF MILK

There are many forms in which milk or milk products may appear. The following are among the most important:

Butter consists almost entirely of separated milk fat, and is produced by churning cream which has "ripened" for several hours. It is a most valuable form of fat.

Buttermilk is the milk left after the fat has been removed in the process of making butter. It is much like skimmed milk in its compo-

[1] Sanitary Code, New York State Health Dept., Chap. III, Regulation 22.
[2] See Vitamin C, pages 55-56.

sition, but is thicker and has an acid taste which appeals to many. Much commercial buttermilk is skimmed milk, artificially treated.

Certified milk is milk produced under strictly supervised conditions of sanitation and marketing. It is the highest grade of commercial milk and is not pasteurized. It is commonly used only for babies and invalids.

Cheese is the consolidated curd of milk. It is made from whole milk, skimmed milk, or cream, and there are many varieties. Cheese is a concentrated and nutritious food, readily assimilated by the normal individual. Care should be exercised, however, in its use for invalids and convalescents.

Cream is the fatty portion of milk which rises to the surface of standing milk or is separated by centrifugal force.

Condensed milk is whole milk, to which sugar has usually been added, concentrated by a process of evaporation. It is commonly diluted with water.

Curds consist of coagulated casein and fat which have been separated from milk, leaving the watery portion known as whey. When made into cottage cheese they form a cheap and nutritious food.

Custards are a mixture of eggs and milk, either baked or soft. Rennet custard is made by adding rennet to sweet milk and allowing the milk to stand. Either of these types of custard offers a valuable method of using milk.

Evaporated milk is whole milk evaporated to one half or less of its original volume. It differs from condensed milk in that no sugar is usually added.

Fermented milk is milk to which various cultures have been added to produce lactic acid fermentation. Kumyss, kefir, and matzoon are types of fermented milk.

Graded milk is commercial milk which conforms to certain legal requirements as to bacteria content and sanitation. In New York State Grade A milk must come from a herd which has passed the tuberculin test; must be bottled where produced, and must be delivered within 36 hours of milking time. Grade B milk may be produced under less rigid supervision and may be carried from the point of production to a bottling plant. Delivery must be made within 48 hours of production.

Homogenized milk is milk in which the fat has been broken into very fine globules as a result of forcing the milk through a very small

opening under high pressure. In homogenized milk the cream remains evenly distributed instead of rising to the top.

Lactic acid milk is produced by adding lactic acid bacilli to whole milk. It is especially valuable in certain forms of indigestion and diarrhea, and is also used in some forms of infant feeding.

Malted milk is a soluble powder prepared from whole milk and malted cereals. Being concentrated and partially predigested, it supplies a great amount of nourishment with little tax on the digestive organs. It is useful in cases of indigestion or fever; also for the convalescent, the aged, the nursing mother, and to some extent in infant feeding.

Modified milk is milk which has been rendered more digestible by dilution, by removal of some of the protein or fat, or by addition of other substances. It is used chiefly for infant feeding and for some special types of cases.

Whey is the watery part of milk left after the curds have been removed. It contains most of the lactose, lactalbumin, mineral matter, and water-soluble vitamins of the milk. It may be used as a beverage or as the liquid in bread making.

BULGARIAN BUTTERMILK (Holt)

1½ to 2 oz. (Bulgarian) starter, *or* 1 buttermilk tablet, *or* 1 tube (1 c.c.) of lactobacillin

1 quart fresh whole milk, *or* skimmed *or* entirely fat-free, *or* pasteurized milk

Dissolve the tablet or lactobacillin in 1 gill of cold water, or if the buttermilk starter is used stir it into the cold milk and place in a half-gallon glass jar, place the cover on loosely, and allow to stand in warm room (80° to 90° F.) 12 to 24 hours until it is well clabbered. When this is accomplished place the jar in the icebox. When thoroughly cold put rubber and cover over jar and "churn" by shaking it vigorously for a minute or two. Or the milk may be prepared in a bowl or pitcher and beaten with an egg beater until smooth and creamy. Save about 4 ounces to use as culture for the next supply. If buttermilk is made daily, a new culture need not be bought oftener than once a month.

If the acid flavor is too mild, let the milk stand cold another day. If desired the buttermilk may be diluted with one-fourth water. A pinch of salt may be added. This buttermilk may be kept on ice or in refrigerator for a week or longer. Where fat is not well borne the cream should be removed from milk before using. For large quantity, use one-half bottle of lactobacillin to a can of milk.

1 cup whole milk buttermilk—Calories, 166: protein, 8 grams; fat, 9 grams; carbohydrate, 12 grams.

CASEIN-CALCIUM MILK

6 oz. 4% milk, *cold*	1.3 grams *or*
10 oz. 4% milk, *hot*	20 grains casein-calcium

Dissolve the casein-calcium in the cold milk and pour into the hot milk. Boil the mixture 5 minutes, stirring constantly. This makes a smooth, homogeneous mixture of thin creamy consistency; to this add 1 pint boiled water or cereal decoction.

The approximate percentage of the constituents and the caloric value are as follows: Calories per ounce, 10: protein, 2 per cent; fat, 2 per cent; carbohydrate, 2.5 per cent.

CURD, FOR INFANTS (Holt)

After all the whey has been drained off coagulated milk or removed by squeezing, the dry curd, with a little salt added, is palatable and often useful in feeding young children convalescent from digestive disturbances. One round tablespoonful may be given to older children 3 or 4 times a day either plain or spread on thin toast. It should not be used for this condition unless freshly made. No sugar should be added before coagulation.

DELAFIELD'S MILK MIXTURE[3]

(Feeding in Nausea)

Milk, 120 c.c. (4 oz.)	Soda bicarbonate, 1⅓ gm. (20 gr.)
Cream, 120 c.c. (4 oz.)	Cerium oxalate, ⅔ gm. (10 gr.)
Vichy, 120 c.c. (4 oz.)	

Delafield's mixtue is often serviceable in the feeding of gastric cases accompanied by much nausea and vomiting, beginning with dram doses every 20 minutes and gradually increasing the dose and later lengthening the intervals.

HYDROCHLORIC MILK

Milk, 1 qt.	Dilute hydrochloric acid, m xxv
Water, 1 pt.	

After adding acid to water, mix with milk and heat to boiling point. Cool before serving.

Calories, 664: protein, 34 grams; fat, 38 grams; carbohydrate, 47 grams.

[3] Herbert Carter, M.D., "Presbyterian Hospital Diet Lists," Philadelphia: W. B. Saunders Co.

KUMYSS

1½ tbsp. sugar
1 tbsp. water
⅙ cake compressed yeast
1 quart milk

Make a thin syrup of the sugar and water and cook 1 minute. Soften the yeast in 2 tablespoons of lukewarm milk. Heat the milk until lukewarm, add the other ingredients, and shake. Put in sterile bottles, cap, and place in an upright position for 12 hours in comfortably warm room (70° F.); then lay on side in lower part of icebox (50° F.). Ready for use after the first 24 hours; can be kept several days, but the longer it is kept the less palatable it is. Open a bottle of kumyss with a champagne tap, or the cork may be punctured with a stout needle to let the gas escape. It should look like thick, foamy cream.

Calories: 756: protein, 34 grams; fat, 38 grams; carbohydrate, 70 grams.

LACTONE BUTTERMILK

1 quart fresh whole milk
1 lactone tablet

Prepare as for Buttermilk (Bulgarian) but allow to stand at temperature of 70°-75° F. for 24 to 36 hours, shaking the bottle occasionally to keep the cream from rising. When sufficiently fermented pour the milk into a bowl and beat briskly for 5 to 6 minutes with egg beater or with churn, and place on ice until ready to serve.

1 cup whole milk buttermilk—Calories, 166: protein, 8 grams; fat, 9 grams; carbohydrate, 12 grams.

MALTED MILK

Mix 2 tablespoons malted milk powder with a little tepid water to make a smooth paste; add ¾ cup water, hot or cold, stirring briskly, and serve.

Hot milk may be used instead of water and a little cream added if desired.

Calories with water, 76: protein, 3 grams; fat, 2 grams; carbohydrate, 3 grams.

Calories with milk, 201: protein, 9 grams; fat, 9 grams; carbohyrate, 22 grams.

MARTIN'S MILK [4]

½ gram, 7½ grains, rennin *or*
1 dram (4 c.c.) liquid rennet
1 pint (500 c.c.) milk

Heat the milk to 98° F., add rennin dissolved in cold water, and allow

[4] *Ibid.*

to coagulate. Beat thoroughly with a Dover egg beater, season with salt, and chill.

Calories, 332: protein, 17 grams; fat, 19 grams; carbohydrate, 24 grams.

PEPTONIZED MILK

1 pint milk	4 oz. water
Peptonizing powder *or*	Pancreatin, gr. v.
1 peptonizing tube	Sodium bicarbonate, gr. xv.

Mix the water and powder. Put in a clean jar or bottle with a cover. Add the milk, shake well, set in a water bath of 115° for 20 minutes for partial peptonizing. Bring immediately to the boiling point. Remove and place on ice. For fully peptonized milk for rectal feeding, the mixtures should remain in water bath for 1 hour and the same procedure followed.

Calories, 332: protein, 17 grams; fat, 19 grams; carbohydrate, 24 grams.

PROTEIN MILK (Eiweiss-Milch)

(Finkelstein)

2 rennet tablets *or*	1 quart milk
1 tsp. rennet extract *or*	1 pint boiled water (cooled)
2 tsp. pepsin	1 pint fat-free buttermilk

Dissolve the rennet tablets in 1 tablespoon of cold water, and add to the milk, or add the rennet extract. Let stand ½ hour at 100° F. Put in cheesecloth and let strain slowly by gravity 1 hour. Add the boiled water to the curd. Then rub gently through a sieve at least twice. The mixture should now have the appearance of milk and the curd should be finely divided. Add the fat-free buttermilk and mix thoroughly. Calories, 676.

RENNET-CUSTARD, FOR INFANTS (Holt)

1 pint fresh cow's milk	2 tsp. essence of pepsin *or*
2 tsp. granulated sugar	½ tsp. rennet extract
1 rennet tablet *or*	

Heat the milk to blood heat (100° F.), add the sugar and the rennet tablet, dissolved in a tablespoonful of cold water, or the rennet extract or essence of pepsin. Stir the mixture for a moment and pour into individual dishes. Allow to stand for 20 minutes, or until firmly coagulated; place in the icebox until thoroughly cold. For older children this may be flavored with nutmeg.

If it is desired to have as little fat as possible, skimmed milk should be used and whey should be strained through fine white muslin without pressure.

Calories, 372: protein, 17 grams; fat, 19 grams; carbohydrate, 34 grams.

RICE MILK

1 oz. rice	¼ tsp. salt
1 pint scalded milk	1 tsp. sugar

Soak the rice for 12 hours, strain, and add the scalded milk, salt, and sugar. Stir well and cook slowly 1 hour. Rub through a fine sieve and thin with more hot milk if desired. Add more seasoning if necessary. Sago or tapioca may be used in the same way.

Calories, 457: protein, 19 grams; fat, 19 grams; carbohydrate, 52 grams.

38.
POULTRY AND GAME

Poultry is the term applied to domesticated birds raised for their flesh or eggs or both. All wild birds are classed as game.

Digestibility Chicken may be introduced early into the dietary of the convalescent, for it is one of the most easily digested meats. Young chickens, ten months old or less, are more easily digested than fowl, or older birds. The white meat of the breast is particularly free from fat, has short, tender fibers and only a small amount of connective tissue; hence is somewhat more rapidly digested than dark meat.

Squab, quail, pigeon, and the white meat of turkey are also digested fairly easily. Duck and goose contain a large amount of fat and are not as rapidly digested. Game is comparatively easy to digest, but it is too highly flavored for most invalids. The cuts from the breast are best for an invalid.

Selecting chickens The cartilage at the end of the breastbone should be soft and pliable, the skin smooth, and the feet soft in young chickens suitable for broiling, frying, or roasting. In a fowl the cartilage at the end of the breastbone is firm, the feet hard and dry.

Dressed weight The term dressed weight means that the bird has been picked but not drawn, and the head and feet have not been cut off. The drawn weight of a bird is, on the average, about ⅕ less than the dressed weight.

COOKING POULTRY AND GAME[1]

The first rule in cooking poultry and game is to use moderate heat, so the meat will be juicy, tender, and evenly done to the bone. This is true of birds of all ages and all kinds. Intense heat hardens and toughens the protein, shrinks the muscle, and forces the juice out.

The second rule is to select the method of cooking according to the

[1] Adapted from *Poultry Cooking,* Farmers' Bulletin No. 1888, U. S. Dept. of Agriculture.

age and fatness of the bird. Fat, tender young birds should be broiled or roasted in an open pan. Young birds which are very lean and full-grown birds too old to roast but which need not be stewed can be braised in a covered roaster or casserole to make them tender. Fowls need long, slow cooking in water or steam to make them tender all through. After that they can be fricasseed, creamed, or prepared in other ways as desired.

These rules apply to both fresh and quick-frozen poultry.

CLEANING AND DRAWING POULTRY

As a rule the bird is drawn at the market. After this is done, pull out the pinfeathers, and singe off the hairs over a hot flame. Scrub the bird with a wet cloth and corn meal or a little mild soap. Rinse thoroughly and wipe dry, then cut out the oil sack on top of the tail.

How to draw poultry If the bird has not been drawn at the market, proceed as follows:

Slit the skin lengthwise at the back of the neck, slip the skin down, and pull out the windpipe and crop, which will be found attached to the skin close to the breast. Next cut the neck off short and save it for making broth or gravy. Cut through the skin under the tail, cutting crosswise of the body and making a cut just large enough to put the hand in. Insert the hand into the body cavity and draw out he entrails, heart, liver, and gizzard. Take care to remove every part of the lungs, which are located on each side of the backbone between the ribs and the kidneys, which are in a hollow near the end of the backbone. Birds drawn at the market often have the lungs and kidneys left in. They should be removed before the bird is cleaned and wiped. When the body cavity is thoroughly clean, wash the bird with cold water and wipe dry inside and out.

GIBLETS

Cut the green gall bladder out of the liver, taking care not to break this sac because it makes the meat bitter. Remove the fat from the gizzard, cut through the lean and discard the inside sac. Slit the heart open and remove blood vessels and clots. Wash the giblets in cold water.

Simmer the giblets and the neck of the bird in salted water to cover

until they are tender. The time will vary with the age of the bird, but allow 1 to 1½ hours for chicken giblets and 2 to 3 hours for turkey. Let the giblets and neck cool in the broth.

BROILING

The broiler heat should be moderate for slow even cooking. If the broiler is deep enough, place the broiler pen so that the meat is 5 or 6 inches from the flame. In broiling over charcoal or live coals, the only way to regulate the heat is to put the food rack far enough away from the fire to permit slow cooking. With an electric range, the best way to regulate the heat is by putting the food different distances from the heating element with the broiler door ajar or open completely. In broiling in a gas or electric range the door should always be left ajar unless the directions with the range state that it should be closed.

BROILED CHICKEN

Select a plump young chicken 8 to 12 weeks old, weighing not more than 2½ pounds dressed. Smaller broilers are often split down the back only and cooked whole, with or without the breastbone. Larger birds are split down back and breastbone so that each half makes a serving. Breaking the joints and removing the wing tips makes the chicken easier to manage on the plate.

Wipe the chicken as dry as possible before cooking. Coat it with melted butter and sprinkle with salt and pepper, place skin side down on a well-greased broiler. Turn the chicken several times as it browns, basting with the pan drippings or more melted butter.

A 2-pound chicken (dressed weight) will need from 35 to 45 minutes to cook evenly to the bone. If preferred, broil about 15 minutes, then place in a dripping pan in a moderate oven (300° to 350° F.) for 12 minutes. Place on a hot dish, season with salt, pepper, and butter, and serve immediately. Garnish with a sprig of green.

BROILED QUAIL

Clean, cut off the head and feet, singe, and wipe with a damp cloth. Bone the bird and wipe thoroughly. Season with salt and pepper, rub thickly with softened butter, and dredge with flour. Broil 10 minutes and serve on hot buttered toast. Garnish with toast points, parsley, and currant jelly.

To bone a bird: Cut off the head and feet, singe and remove pin

feathers, crop, and oil sac. Cut off the wings close to the body. Lay the bird breast down on a board and cut to the bone the whole length of the spine. Scrape the flesh from the backbone the entire length of the body, working toward the breast, and cutting the tendons as reached. When the edge of the breastbone is reached, take care not to break through the skin. Scrape the flesh from the second joints and drumsticks, laying the flesh back and pulling out the bone as if turning a glove inside out. Scrape the flesh from the lower part of the back and withdraw the rack from the carcass. Put the flesh back in its original shape and broil or stuff.

BROILED SQUAB, GUINEA, DUCKLING

Squabs, young guineas, and duckling are all broiled like chicken. Squab may be boned and broiled like quail if preferred.

BROILED SMALL BIRDS

All small game birds can be broiled like quail.

BROILED BIRDS IN PAPER

Cut a piece of parchment paper more than twice the size of the bird. Spread the paper evenly and thickly with butter, lay the bird on it, and double the edges of the paper together. Fold and crease the edges on the three sides, then fold and crease again so the butter cannot run out. These folds should be half an inch wide. Broil, not too near the heat, turning often so the temperature will not get too high. A bird broiled in this fashion is basted with butter and its own juices, and the flavor is very delicate. Season with salt and pepper and serve hot.

If the paper should catch fire, the bird need not be spoiled. Take it out, wrap it again, and start over.

ROASTING

Choose a young, well-fattened bird for roasting. Chickens suitable for roasting are usually 5 to 9 months old, depending on the breed; capons are 7 to 10 months old; turkeys, 5 to 9 months. Guineas are good for roasting when 5 to 10 months old, geese when 5 to 11 months. Farm ducks can be roasted when 4 to 9 months old; but "green" ducks —the kind sold on a commercial scale—are much younger, only 10 to 12 weeks old. Female birds which have started to lay are not suitable for roasting.

A roasting bird should have a well-rounded body, a well-fleshed

breast, a good coating of fat under the skin, few blemishes and few pinfeathers. It is economical to buy a larger bird than needed for one meal or two, because the larger the bird, the more meat in proportion to bone. Roast poultry is excellent for slicing cold, or for making creamed chicken.

ROAST POULTRY

When the bird has been cleaned and drawn, sprinkle the inside with salt and fill the body cavity with stuffing. Do not pack the stuffing, but leave room for it to expand. To help hold in the stuffing at the tail, slip a large piece of bread crust into the opening. With turkeys, chickens, or guineas, tuck the legs into the band of skin left when the crosswise opening was cut. Put a stitch through the skin at the end of the breastbone and wrap the cord around the legs and under the tail to help hold the legs in place. With ducks or geese, or any other bird drawn with a lengthwise cut in the body, sew the edges of the skin together or lace them with twine and poultry pins, then tie the legs close to the body.

Stuff the loose skin at the neck, fold the skin toward the back, and fasten with a skewer, poultry pins, or a few stitches.

Fold the wing tips back on the wings or cut off the tips and tie the wings across the back close to the body. Do not tie a string across the breast; it will leave a mark.

Rub chicken, turkey, or guinea all over with butter, sprinkle with salt, and dust with flour. If the bird is lean, lay several strips of salt pork or bacon over it. Ducks and geese do not need any added fat. Sprinkle with salt and flour directly on the skin.

Use a shallow, uncovered pan with a rack on the bottom for cooking. Start a turkey or guinea on one side of its breast on the rack; a duck or goose squarely breast down; a chicken either sideways or squarely on its breast, depending on its shape. Do not add water and do not cover the bird.

The oven temperature should be moderate, or even slow, for the whole cooking period.

The bird should be turned from time to time so all parts will be evenly done. Turn birds under 12 pounds every 30 or 45 minutes; large birds every hour. Lift the bird at head and foot with clean folded cloths or paper towels to keep from breaking the skin when turning. Baste turkeys, chickens, and guineas with melted butter or with pan drippings. Ducks and geese are self-basters.

When a bird is done, the flesh is slightly shrunken beneath the skin and the bird bends slightly when picked up by the ends. The breast and thigh are tender and do not show pink juice when speared with a skewer or fork.

TIMETABLE FOR ROASTING YOUNG BIRDS [2]

BIRD	DRESSED WEIGHT, LB.	OVEN TEMP., F.	TIME, HOURS
Chicken	4-5	350	1½-2
Duck	5-6	350	2-2½
Goose	10-12	325	3-4
Guinea	2-2½	350	1½
Turkey	6-9	325	2½-3
	10-13	300	3½-4½
	14-17	275	5-6
	18-23	250-275	6½-7½
	24-30	250	8-9

STUFFING FOR POULTRY

All stuffings for poultry are built on a starchy base—bread crumbs, rice, or mashed potatoes. To this base is added melted butter and seasoning—herbs such as sweet marjoram, thyme, and sage; and also vegetable seasonings such as celery, parsley, and onion. Other additions to stuffing are nuts, oysters, mushrooms, dried apricots or prunes, raisins, sausage, diced salt pork fried crisp, and tart apple cubes candied with sugar.

Stuffings are either dry—that is, made of dry bread crumbs without milk or water; or they are moist, being built on a foundation of rice, potatoes, apples, or bread crumbs with added liquid.

To make crumbs for the dry stuffing, use bread 2 to 3 days old. Cut the loaf in two and fork out the inside, leaving the crusts. Pick the pieces of bread apart with the tips of the fingers. One loaf of bread will make about 4 cups of crumbs, enough to stuff a 5-pound bird. For a 5-pound bird, use the following amount of stuffing:

- ⅜ cup butter
- 1 cup chopped celery
- ¼ cup chopped parsley
- ½ small onion, chopped
- 4 cups bread crumbs
- 1 tsp. savory seasoning
- 1 tsp. salt
- Pepper to taste

Cook the celery, parsley, and onion in the butter for few minutes. Add the bread crumbs and dry seasoning and stir all together. Add nuts if desired. Omit the onion if desired.

Calories, 1535: protein, 31 grams; fat, 76 grams; carbohydrate, 182 grams.

[2] *Ibid.*

GRAVY FOR ROAST POULTRY

Pour the drippings out of the roasting pan and let the fat rise to the top. Skim off the fat and set it aside. For each cup of liquid, brown stock and the water the giblets were cooked in, measure 1½ to 2 tablespoons of flour and place in the roasting pan. With the flour blend an equal quantity of the fat skimmed off the stock. Stir the flour and fat until smooth, then add the liquid, stirring constantly over a low fire. When the gravy has cooked 5 minutes, season to taste with salt and pepper. Add the finely chopped giblets if desired.

STEWING AND STEAMING

Long, slow cooking in water or steam softens the connective tissue and makes old birds tender. The fowl gives up some of its flavor, but this is regained when the broth is made into gravy and served with the meat. Birds are stewed or steamed either whole or in pieces.

STEAMED CHICKEN

Place the bird on a rack in a kettle, fill the kettle up to the level of the rack with lightly salted water, and steam. As the water boils away add more. Cook 3 to 4 hours, or until tender. Leave the bird breast down in the broth to cool for an hour.

STEWED CHICKEN

Place the bird on a rack in the kettle and fill the kettle half full of lightly salted water. Partly cover and simmer till the bird is tender, 3 or 4 hours. Cool as for steamed chicken.

FRICASSEED CHICKEN

Cut a fowl into pieces for serving. Place the pieces in a kettle, cover with lightly salted water, and cook covered until the bird is tender. Simmer 3 or 4 hours. When done, remove from the broth and keep hot.

Skim the fat from the broth and measure the broth. For each cup of broth mix 1½ to 2 tablespoons of the fat with an equal quantity of flour. Stir a little hot broth into the flour, then pour into the kettle. Cook the gravy until slightly thick and season to taste. Arrange the chicken on a platter and pour gravy over it.

CREAMED CHICKEN
(Individual rule)

½ tbsp. butter
½ tbsp. flour
¼ cup rich milk, scalded
⅓ cup cold cooked chicken
¼ cup chopped chicken
Salt
Celery salt

Melt the butter in a saucepan, add the flour, and gradually pour on the scalded milk. Cook thoroughly, stirring constantly. Add the chicken cut into dice. Season, heat well, and serve on toast, garnished with parsley, or use as a filling for pastry shells.

Calories,[3] 173: protein, 11 grams; fat, 11 grams; carbohydrate, 7 grams.

SCALLOPED CHICKEN

Put creamed chicken into a small baking dish, cover with dried bread or cracker crumbs, dot with small pieces of butter, and brown in the oven.

JELLIED CHICKEN
(Individual rule)

1 tsp. gelatin
2 tsp. cold water
½ cup strong chicken broth
¼ cup chopped chicken
Salt
Celery salt

Soak the gelatin in the cold water for 5 minutes. Add the boiling hot broth and stir until dissolved. Season to taste. Dip a mold into cold water and pour in enough gelatin to cover the bottom. Put in the icebox to harden and when firm decorate with a slice of hard-cooked egg. Or, if desired, cook a couple of carrots and cut a small round from one to form the center of a daisy, cutting the other into strips to represent the petals. Put in the bottom of the mold, add a few drops of gelatin to keep the decoration in place, and put on ice to harden. Mix the chicken with the remainder of the gelatin, pour into the mold, and set to harden. Serve on lettuce leaf or garnish with parsley.

Calories,[3] 87: protein, 12 grams; fat, 4 grams.

[3] Calculated with 1½ ounces of fowl.

39.

SALADS AND SALAD DRESSINGS

Salads are of two types: those made entirely of the crisp green leaves of salad plants, called "green salads"; and those made of meat, shellfish, fruit, or vegetables garnished with lettuce or some other salad plant. Both types are usually served with salad dressing.

Green salads are chiefly appetizers, but they are important in the diet because of their high mineral and vitamin content. The other salads have additional nutritive value, depending on the ingredients used.

Salads should be arranged attractively and always served cold. Lettuce and other salad plants should be fresh, crisp, and dry. Chill until crisp in a tightly covered pan in the refrigerator. Wash thoroughly and dry by placing on a clean towel so that the water will drain from the leaves, or fold lightly in a towel. Parsley is revived quickly by sprinkling with cold water, putting it into an air-tight fruit jar and keeping it in a cold place. Treated in this way it will keep its freshness a long time.

Dressing should not be added to green vegetables until just before serving, as it tends to wilt them.

Meat to be used in salads should be free from skin and gristle and should be cut into small cubes, mixed with French dressing, and allowed to stand some time before combining with the vegetables.

A dainty salad served with a crisp cracker or cheese wafer forms an acceptable luncheon for the convalescent. It may also be served with dinner.

SALADS

CHICKEN SALAD

(6 servings)

2 cups cooked chicken meat (3/4 lb.)	1/4 tsp. salt
1 cup cut celery	1/8 tsp. pepper
2 tbsp. olive oil	1 tbsp. vinegar
	2 tbsp. mayonnaise

Dice the cold chicken and cut the cleaned celery into small, uniform pieces. Mix these together and add the oil. Stir well, then sprinkle with salt and pepper to taste, add the vinegar, blend, and put in a colander to drain. Keep in a cold place for 2 or 3 hours. Just before serving add the mayonnaise, put the salad on a bed of lettuce, and garnish with olives, celery leaves, or white lettuce.

Calories, 1000: protein, 74 grams; fat, 76 grams; carbohydrate, 5 grams.

CREAM OR COTTAGE CHEESE SALAD[1]

1½ cups prepared Cottage Cheese
¼ cup minced liver
¾ cup dressing
Green salad

Shape prepared cheese mixed with minced liver into balls (about 2 tablespoons for a 1-in. ball, 2 to be served each person). Or pack in large mold, chill and slice. If the balls are rolled on butter paddles they will be marked with a pattern. They are often dashed with paprika.

Serve with green salad and French, boiled, or mayonnaise dressing.

FRUIT SALAD

Any combination of fruit desired may be used served with Fruit Salad Dressing. An attractive combination is a banana peeled and cut in half crosswise. Cut one-half lengthwise, arrange on a lettuce leaf, add a little dressing, and garnish with malaga grapes, cut in half and seeded, and small pieces of English walnuts.

MARGUERITE SALAD

Cut 1 hard-cooked egg crosswise and remove the yolk. Cut the white in slices, petal fashion. Arrange on lettuce leaf like a marguerite and fill the center with the yolk put through the potato ricer or strainer. Garnish with parsley and serve with French, boiled, or mayonnaise dressing.

MIXED SALAD

Take equal proportions of green peas, cooked and drained, celery cut in thin slices, and English walnuts cut into small pieces. Season with salt and pepper, add mayonnaise, and serve on lettuce leaves. Garnish with ripe cherries on the stem with blanched hazelnuts in place of stones.

[1] From *Everybody's Cookbook*, edited by Isabel Ely Lord, New York: Harcourt, Brace and Co., 1937. Reprinted by permission.

ORANGE AND DATE SALAD

(6 servings)

Separate 1 package of dates, cover with boiling water, and cook for 2 or 3 minutes. Drain and dry in the oven. Cool, stone, and cut in halves lengthwise. Halve 4 large oranges and cut out the sections of pulp. Arrange crisp lettuce leaves on a platter, pile the orange in the center, and surround with the dates. Serve with French dressing.

SWEETBREAD SALAD

Mix equal parts of parboiled sweetbreads cut into half-inch cubes and celery cut in thin slices. Season with salt and moisten with mayonnaise dressing. Arrange on lettuce leaves.

WALDORF SALAD

Mix equal parts of apples, pared and cut into small cubes, celery sliced in thin circles, and English walnuts cut into small pieces. Season with salt and moisten with mayonnaise. Serve on a lettuce leaf, garnished with a spoonful of whipped cream and halves of English walnuts or pecans.

WATER-LILY SALAD

Cut 1 hard-cooked egg in halves crosswise in fence fashion. Remove the yolk, put through a strainer, and refill white. Serve with French, boiled, or mayonnaise dressing on shredded lettuce leaves garnished with parsley.

SALAD DRESSINGS

BOILED SALAD DRESSING

2 or 3 tbsp. sugar
3 tbsp. flour
1 tsp. salt
½ tsp. dry mustard
Few grains cayenne
1 egg
1 cup milk
1 tbsp. butter
¼ cup mild vinegar

Combine sugar, flour, salt, pepper, and mustard in the top of a double boiler. Add the unbeaten egg and beat until well blended. Add the cold milk and cook over hot water for 15 minutes, stirring constantly until thickened. Then add the butter and acid and cook 3 or 4 minutes longer. Strain, cool, and thin to right consistency with cream.

If the custard curdles, beat over cold water until smooth.

Calories, 550: protein, 17 grams; fat, 28 grams; carbohydrate, 58 grams.

FRENCH DRESSING

(Individual rule, 1/3 of recipe)

- 1 tbsp. vinegar
- 2 tbsp. olive oil
- 1/3 tsp. salt
- 1/8 tsp. pepper

Mix all ingredients thoroughly and pour over salad just before serving. Calories, 270: fat, 30 grams.

FRUIT SALAD DRESSING

- 1/4 to 1/3 cup sugar
- 1 tbsp. flour
- 1/3 tsp. salt
- 1 egg
- 1/2 cup heavy cream
- 1/3 cup mild acid (juice of 1 lemon with pineapple juice to make 1/3 cup)

Combine sugar, flour, and salt in the top of a double boiler. Add the unbeaten egg and beat thoroughly. Add the acid and cook over hot water until very thick. Cool and fold in stiffly whipped cream, 2 tablespoons or more.

Calories,[2] 793: protein, 10 grams; fat, 54 grams; carbohydrate, 66 grams.

MAYONNAISE DRESSING

(Individual rule, 1/4 of recipe)

- 1 tsp. mustard
- 2 tsp. powdered sugar
- 1 tsp. salt
- Few grains cayenne
- Yolks of 2 eggs
- 1 1/2 cups olive oil *or* salad oil
- 2 tbsp. vinegar
- 2 tbsp. lemon juice

Have all ingredients and utensils thoroughly chilled and place the mixing bowl in a pan of crushed ice while blending.

Mix the dry ingredients, add to the egg yolks, and mix thoroughly. Add a few drops of oil at a time until half a cup is used, beating with egg beater or wooden spoon. Then add alternately a few drops of vinegar and lemon juice and the remainder of the oil, taking care not to lose the stiff consistency.

If the dressing curdles, take another egg yolk and add the curdled mixture to it slowly, beating constantly.

Calories, 2842: protein, 5 grams; fat, 310 grams; carbohydrate, 8 grams.

[2] Calculated with 1/4 cup sugar.

RUSSIAN DRESSING

To 1 cup of mayonnaise add 1/3 cup of tomato catsup, chili sauce, or tomato pulp. If tomato pulp is used, add more acid to the mayonnaise.

THOUSAND-ISLAND DRESSING

(Individual serving)

- 1 tbsp. mayonnaise
- 1 tsp. chili sauce
- 1 tsp. chopped sour pickle
- 1 tsp. chopped green pepper
- 1 tsp. chopped olives

Blend the ingredients and chill.

40.
SOUPS

Soups are a light and suitable food for the sick. They are divided into two classes: those made with meat and those made without meat. The meat soups are discussed in the section on Meat Broths in Chapter 36. Soups without meat are built on a foundation of milk, vegetables, and water. They are appetizing and nutritious and offer an excellent means of serving milk and the starch and mineral matter of the vegetable. Soups may be served as a luncheon with crisp crackers or as the first course of a dinner. Serve in heated bouillon cups, partly filled, on a small plate and doily.

CREAM SOUPS

The foundation of cream soups is a sauce and a stock. The stock gives the flavor and the name to the soup—cream of chicken, cream of pea, etc.

To prepare vegetable stock Cook the vegetables until very soft. Except for potatoes and vegetables with a strong odor, use part or all of the water in which the vegetable was cooked, and rub the vegetable through a sieve or food mill. This is the vegetable stock.

To prepare sauce Use the basic recipe for a thin white sauce (page 511).

To blend the soup Combine the white sauce and the vegetable stock. Season, strain, and serve immediately.

The proportion of stock and sauce may be one-fourth, one-third, or one-half, sometimes equal parts.

CREAM OF ASPARAGUS SOUP
(2 servings)

1/4 bunch asparagus	1 cup hot milk
1/2 tbsp. butter	Salt
3/4 tbsp. flour	Pepper

(*a*) Wash the asparagus and cook in boiling salted water, boiling gently

30 minutes. Take from the water, cut off the tips, and put them into the serving dish; press the remainder through a colander or food mill.

(*b*) Melt the butter in a saucepan, add the flour, and gradually pour on the milk. Cook thoroughly, stirring often.

Blend (*a*) and (*b*); reheat, season to taste, strain over the tips, and serve at once with crisped wafer crackers.

Calories,[3] 266: protein, 11 grams; fat, 16 grams; carbohydrate, 20 grams.

CREAM OF CELERY SOUP

(2 servings)

4 stalks celery	1 tbsp. butter
½ cup boiling water	1 tbsp. flour
Salt and pepper	1 cup hot milk

(*a*) Wash and scrape the celery and cut into small pieces, add the water, and cook until very tender and soft. Renew the water if it boils away. Mash the celery in the water in which it was cooked.

(*b*) Melt the butter in a saucepan, add the flour, and gradually pour on the milk. Cook thoroughly, stirring carefully.

Blend (*a*) and (*b*); season to taste, strain and serve immediately with croûtons or crisped crackers.

Calories, 325: protein, 11 grams; fat, 22 grams; carbohydrate, 21 grams.

CREAM OF CORN SOUP

(2 servings)

½ cup corn	1 tbsp. flour
½ cup cold water	1 tbsp. butter
1 cup milk	Salt and pepper
¼ slice onion	Yolk of 1 egg, beaten

(*a*) Chop the corn, add the water, and simmer 20 minutes. Rub through a sieve or food mill.

(*b*) Scald the milk with onion; remove the onion. Melt the butter in a saucepan, add the flour, and gradually pour on the milk.

Blend (*a*) and (*b*); cook thoroughly, season to taste with salt and pepper, and pour over the beaten yolk. When well blended, serve hot.

The yolk of egg may be omitted.

Calories, 500: protein, 17 grams; fat, 28 grams; carbohydrate, 45 grams.

[3] Calculated with 100 grams asparagus.

CREAM OF PEA SOUP
(Individual rule)

½ cup peas	½ tbsp. butter
½ tsp. sugar	½ tbsp. flour
⅓ cup cold water	Salt and pepper
½ cup milk	

(*a*) Drain the peas from their liquor, rinse thoroughly, add sugar and cold water, and simmer 20 minutes. Rub through a sieve or mill and reheat.

(*b*) Melt the butter in a saucepan, add the flour, and gradually pour on the milk. Cook thoroughly, stirring carefully.

Blend (*a*) and (*b*).

Calories, 224: protein, 8 grams; fat, 11 grams; carbohydrate, 23 grams.

CREAM OF POTATO SOUP
(Individual rule)

¾ cup milk	½ tbsp. flour
¼ slice onion	¼ tsp. salt
¼ cup mashed potatoes	Pepper
½ tbsp. butter	

(*a*) Scald the milk with onion in it. Remove the onion and add milk slowly to the potatoes.

(*b*) Melt the butter in a saucepan, add the flour, and gradually pour on the hot mixture. Cook thoroughly and season to taste. A little celery salt may be added if desired. A little finely chopped parsley may be sprinkled over the top of the soup.

Calories, 243: protein, 8 grams; fat, 16 grams; carbohydrate, 17 grams.

CREAM OF RICE SOUP
(Individual rule)

1 cup milk	⅛ bay leaf
1 tbsp. rice	Stalk of celery
¾ tbsp. butter	Salt
⅛ small onion	Pepper

Scald the milk, add the well-washed rice, and cook in the top of a double boiler 30 minutes, covered closely.

Melt the butter in sauté pan, add the sliced onion, and cook till tender but not brown. Add the celery sliced, and turn into the scalded milk; add the bay leaf, cover, and let stand over hot water for 15 minutes. Strain,

season with salt and pepper, reheat, and serve. If the soup is too thick, add a little heated milk.

Calories, 288: protein, 9 grams; fat, 19 grams; carbohydrate, 20 grams.

CREAM OF SPINACH SOUP

(2 servings)

For each cup of thin white sauce (page 511) use ¼ cup cooked spinach plus ½ cup spinach juice or water. Rub through a colander. Season to taste.

Calories, 315: protein, 11 grams; fat, 22 grams; carbohydrate, 19 grams.

BISQUES

MOCK BISQUE SOUP

(Individual rule)

½ cup tomatoes
1/16 tsp. soda
1 cup milk
1 tbsp. butter
¾ tbsp. flour or cornstarch
Salt and pepper

(*a*) Steam the tomatoes until soft enough to strain the juice. Strain, add the soda, and allow gases to pass off. This prevents the acid of the tomato from curdling the milk.

(*b*) Melt the butter in saucepan, add the flour, and gradually pour on the milk. Cook thoroughly, stirring carefully.

Blend (*a*) and (*b*); reheat, season to taste, strain, and serve immediately with croûtons or crackers.

Calories, 316: protein, 10 grams; fat, 22 grams; carbohydrate, 20 grams.

TOMATO SOUP

(Individual rule)

½ cup strained tomatoes
½ tbsp. butter
½ slice onion
1 tbsp. flour
1 cup water or stock
¼ tsp. salt
Few grains pepper

(*a*) Cook and strain the tomatoes, obtaining ½ cup of juice.

(*b*) Melt the butter in a sauté pan, add the onion and brown slightly, add the flour and gradually pour on the boiling water or stock.

Blend (*a*) and (*b*), cook thoroughly, season with salt and pepper, strain and serve.

Two tablespoons of cream may be added if desired.

Beef or mutton broth strained may be used in place of water.

Calories, 103: protein, 2 grams; fat, 6 grams; carbohydrate, 10 grams.

VICTORIA SOUP

(2 servings)

½ cup cracker crumbs
1 cup milk
½ cup lean chicken meat (3 oz.)
1 cup strong chicken broth
½ tsp. salt
Yolks of 2 eggs
Pepper

Soak the crumbs in a little of the milk. Cook the yolks of eggs in hot water until hard. Chop the chicken and mix with the soaked cracker crumbs. Press the hard-cooked yolks through a coarse strainer, add seasonings and broth, and cook all together 5 minutes over direct heat or 30 minutes in a double boiler. Serve hot.

Calories, 570: protein, 39 grams; fat, 31 grams; carbohydrate, 34 grams.

41. VEGETABLES

Vegetables are plants cultivated for food. In many sections of the country fresh vegetables are now available throughout the year. These may be supplemented by so many varieties of canned and frozen vegetables that there is no reason for any diet to be inadequate for want of these foods.

Classification Vegetables are classified as:

1. Seeds—peas, beans, lentils, corn, etc.
2. Roots and tubers—potatoes, beets, turnips, carrots, parsnips, etc.
3. Flowering heads—Cauliflower, asparagus, broccoli, French artichokes, etc.
4. Stems and leaves—lettuce, spinach, celery, chard, etc.
5. Fruits—tomatoes, cucumbers, squash, okra, peppers, eggplant, etc

Composition The chief organic constituent of vegetables is carbohydrate, in the form of either sugar or starch. All except the legume are low in protein, while the fat content is almost negligible. As a clas vegetables are rich in minerals, vitamins, and cellulose, and all contai a high percentage of water.

Fresh legumes, such as peas and beans, contain about 8 per cen protein, from 16 per cent to 25 per cent carbohydrate, and a trace o fat. When dried they contain from 21 per cent to 25 per cent protei as much as 62 per cent carbohydrate, and over 1 per cent fat.

Roots and tubers contain a large amount of sugar and starch, an are also important sources of vitamins and minerals. Their protein an fat content is low. The potato, probably the most important vegetab of this class, contains approximately 78 per cent water, 18 per cer carbohydrate, 2 per cent protein, 0.1 per cent fat, together with impo tant minerals and vitamins.

Beets, carrots, turnips, onions, parsnips, and salsify, the most com mon of the succulent vegetables, contain a greater percentage of cell

lose than do the starchy vegetables. Their characteristic flavors and odors are due to the presence of volatile organic compounds.

Nutritive value The constituents of 100-gram portions of some of the more common vegetables are as follows:

100 GRAMS FRESH	GRAMS OF PROTEIN	GRAMS OF CARBOHYDRATE	GRAMS OF FAT	CALORIES
Asparagus	2.2	3.9	0.2	26
Beans, lima	7.5	23.5	0.8	131
Beans, snap, string	2.4	7.7	0.2	42
Beets	1.6	9.6	0.1	46
Broccoli	3.3	5.5	0.2	37
Cabbage	1.4	5.5	0.2	30
Carrots	1.2	9.3	0.3	45
Cauliflower	2.4	4.9	0.2	31
Celery	1.3	3.7	0.2	22
Corn	3.7	20.5	1.2	108
Cucumber	0.7	2.7	0.1	14
Eggplant	1.1	5.5	0.2	28
Escarole	1.6	2.9	0.3	21
Kale	3.9	7.2	0.6	50
Kohlrabi	2.1	6.7	0.1	36
Lentils	7.4	18.0	0.3	105
Lettuce	1.2	2.9	0.2	18
Mushrooms	(0)	(0)	0.3	..
Okra	1.8	7.4	0.2	39
Onions	1.4	10.3	0.2	49
Parsnips	1.5	18.2	0.5	83
Peas	6.7	17.7	0.4	101
Potato	2.0	19.1	0.1	85
Spinach	2.3	3.2	0.3	25
Squash, summer	0.6	3.9	0.1	19
Swiss chard	1.4	4.4	0.2	25
Turnip	1.1	7.1	0.2	35

Digestibility As the gastric ferments play no part in carbohydrate digestion, vegetables are digested mainly in the intestines. The presence of cellulose prevents the rapid digestion of the nutrients, hence it may be stated as a general rule that vegetable food is less completely digested and absorbed than animal food.

General rules for cooking vegetables

1. Wash thoroughly.

2. Let stand in cold water if wilted or to keep from discoloring.

3. Pare, brush, or scrape, according to kind.

4. To preserve vitamins and minerals, vegetables should be cooked with as little water as possible—about ¼ cup of water or less to 1 cup of vegetables.

5. Green vegetables should be cooked uncovered.

6. Mild-flavored vegetables should be steamed or cooked in just enough boiling water to prevent burning so that none of the juice need be discarded.

7. Strong-flavored vegetables should be cooked uncovered in a larger amount of water. The flavor will thus be milder and the odor less pronounced while cooking.

8. Add salt when vegetables are nearly cooked.

9. If the water is actually boiling when the vegetables are put into it, and if it is kept boiling gently throughout the cooking period, considerable time is saved. If tough stems of leafy vegetables are removed, the cooking period is about halved and the vegetable undergoes small loss of food value.

10. Overcooking vegetables injures their flavor and makes them tough and hard to digest.

ASPARAGUS

Boiled Asparagus.—Prepare asparagus by cutting off the lower part of the stalks at the point at which they will snap. Wash, remove scales, and tie together or cut into 1-inch pieces. Cook in boiling salted water until soft, 15 to 25 minutes. As the tips are more tender, keep them out of water the first 10 minutes of cooking. Drain, place in a hot serving dish, spread with ½ teaspoon of butter, and sprinkle with salt.

Asparagus on Toast.—Serve boiled asparagus on buttered toast moistened with a little of the liquid the asparagus is cooked in.

Creamed Asparagus.—Pour Cream Sauce 1 (page 630) over boiled asparagus and serve hot, plain or on toast.

100 grams, fresh asparagus, 8 stalks, 4 inches long.—Calories, 26: protein, 2 grams; carbohydrate, 4 grams.

100 grams, canned, 10 tips.—Calories, 20: protein, 2 grams; carbohydrate, 3 grams.

Timetable for cooking vegetables The best rule for knowing how long to cook vegetables is to test by tasting a small portion. A vegetable is done when it is tender, but not soft and flabby. When done, stop the cooking process at once.

CARROTS

Boiled Carrots.—Wash thoroughly and scape off the very thin skin. Slice or dice and cook in boiling water 10 to 15 minutes or until soft. Serve plain with a little melted butter, salt, and pepper, or mash and season to taste.

Creamed Carrots.—Pour Cream Sauce 1 (page 630) over boiled diced carrots, reheat, and serve.

100 grams, cooked carrots, 3/4 cup.—Calories, 45: protein, 1 gram; carbohydrate, 9 grams.

TIMETABLE FOR BOILING VEGETABLES [1]

	MINUTES		MINUTES
Artichokes, French	25-40	Kale	10-25
Asparagus	15-25	Kohlrabi	30
Beans, dried, soaked		Lentils, dried, soaked	30-60
navy and kidney	90-120	Okra	10-20
lima	30-45	Onions, whole	30-40
Beans, fresh		Parsnips, whole	20-30
lima	30	Peas, dried, soaked	30-60
snap	20-30	Peas, fresh	10-20
Beets		Potatoes, whole	35-60
young	30-45	Rutabagas	20-30
mature	60-90	Spinach	5-10
greens	10-15	Squash, summer	15
Broccoli	15-25	Swiss chard	
Brussels sprouts	15-20	leaves	10
Cabbage		stalks	30
quartered	10-15	Tomatoes	
shredded	5-10	green	20-35
Carrots	10-25	ripe	10-20
Collards	20	Turnips	15-20
Corn on the cob	8-12	greens	10-20
Dandelion greens	10-20		

Note: For steaming time, increase the boiling time by 25 to 30 per cent. For baking time, increase the boiling time by 75-100 per cent.

[1] Compiled from various publications of the Bureau of Human Nutrition and Home Economics, U. S. Department of Agriculture.

CAULIFLOWER

Boiled Cauliflower.—Cut off the stalk and remove the leaves of the cauliflower. Soak 30 minutes in cold water to cover, head down. Cook, head up, 20 to 30 minutes, or until soft, in boiling water. Drain and separate flowerets.

Creamed Cauliflower.—Pour Cream Sauce 1 (page 630) over boiled cauliflower, reheat, and serve.

100 grams, cooked cauliflower, ¾ cup.—Calories, 31: protein, 2 grams; carbohydrate, 5 grams.

CELERY

Scrape the celery. Cut the stalks into ½-inch pieces and cook uncovered in boiling water 20 to 30 minutes. Serve with Cream Sauce 1 (page 630). The sauce may be made using part milk and part water in which celery was cooked.

100 grams, fresh celery, 4 stalks.—Calories, 22: protein, 1 gram; carbohydrate, 4 grams.

FRIED EGGPLANT

Peel and cut into thick slices. Dip in egg and crumbs and fry in a hot pan 5 to 8 minutes, until brown. Or cut into long pieces, dip in egg and crumbs, and fry in deep fat.

STUFFED EGGLANT

1 eggplant
1 cup soft stale bread crumbs
½ tbsp. finely chopped onion
2 tbsp. melted butter
1 egg
2 tbsp. bread crumbs
1 tbsp. butter

Cook eggplant 15 minutes in boiling salted water to cover. Cut slice from top, scoop out pulp with spoon, not too closely to skin. Chop pulp, add 1 cup stale bread crumbs, 2 tablespoons melted butter and onion. Cook 5 minutes with a little stock or water, cool slightly and add 1 beaten egg. Refill eggplant, cover with buttered crumbs and bake 25 minutes in a hot oven.

Calories, 707: protein, 18 grams; fat, 45 grams; carbohydrate, 60 grams.

ONIONS

Boiled Onions.—Put young onions into pan of cold water and peel under water. Cook in boiling salted water 30 to 40 minutes or until tender. Drain, add a little milk, cook a few moments, and add butter, salt, and pepper.

Creamed Onions.—Pour Cream Sauce 1 (page 630) over boiled onions, reheat, and serve.

Scalloped Onions.—Place the onions in a baking dish and add Cream Sauce 1 (page 630). Cover the top with buttered cracker or bread crumbs and bake until the crumbs are a golden brown.

100 grams onions, 3 med. cooked. or scallions, 20 small.—Calories, 49: protein, 1 gram; carbohydrate, 11 grams.

PEAS

Green Peas.—Shell the peas and cook in a small quantity of boiling salted water 10 to 20 minutes, or until soft. There should be little or no water to drain from peas when they are cooked. A small quantity of sugar may be added if the natural sweetness of the peas has been lost. Season with butter and salt.

Canned Peas.—Heat the peas in their own liquor. Add salt, pepper, and a little sugar if needed. Let stand 10 minutes and drain. Dot generously with butter. Cover tightly and keep warm until the butter is melted. Serve. Save the liquor for soups, etc. Vitamins B, C, and G are in the liquor—as much per unit of weight as in the peas. Minerals, too, are in the liquor.

One serving, without seasoning, 4 oz.—Calories, 114: protein, 8 grams; carbohydrate, 20 grams.

Creamed Peas No. I.—To ⅓ cup of cooked peas add 1 teaspoon of flour mixed with ⅛ teaspoon of sugar. Cook slightly and add 1 tablespoon of cream and salt and pepper to taste.

Creamed Peas No. II.—Pour Cream Sauce 1 (page 630) over drained cooked peas, reheat, and serve.

POTATO CAKES

Form cold mashed potatoes into slightly flattened balls. Put them in a floured tin, brush each over with milk, and bake in a hot oven 5 minutes, or till a delicate brown.

These cakes may be rolled in flour and sautéed in a little beef fat or butter if desired.

POTATOES AU GRATIN

Cut cold boiled potatoes into cubes and put them into a buttered baking dish. Cover with white sauce, put buttered cracker or bread crumbs on top, and bake until golden brown.

A little grated cheese added to the white sauce just before pouring over the potatoes adds a pleasant flavor.

BAKED POTATOES

Select potatoes of uniform size, not very large, and wash thoroughly. Bake in moderately *hot* oven (425° F.) from 35 minutes to 1 hour. When baked break open slightly to let the steam escape and serve on a folded napkin.

1 medium.—Calories, 85: protein, 2 grams; carbohydrate, 19 grams.

BOILED POTATOES

Select potatoes of uniform size. Wash, pare, and put them into cold water to keep from discoloring. Cover with boiling water, boil, and when partly cooked add 1 tablespoon salt to every 6 potatoes. Cook until soft, 35 minutes to an hour, drain very dry and shake the pan, without a cover, gently over the stove till the potatoes are mealy, or cover with a folded cloth to absorb the moisture. Serve in an open dish.

1 medium.—Calories, 85: protein, 2 grams; carbohydrate, 19 grams.

CREAMED POTATOES

¼ cup milk
1 cup cold sliced or cubed potatoes
2 tsp. butter
¼ tsp. salt
½ tsp. finely chopped parsley
Few grains white pepper

Heat the milk, add the potatoes, and cook until they have nearly absorbed the milk. Add butter and seasoning, cook 5 minutes longer, add parsley, and serve hot.

Calories, 275: protein, 6 grams; fat, 10 grams; carbohydrate, 38 grams.

POTATOES IN THE HALF-SHELL

Cut off tops of baked potatoes and scoop out the inside. Mash and season well as for mashed potatoes and add the well-beaten white of 1 egg. Fill the skins with the mixture, heaping it lightly on top, brush over with milk or slightly beaten white of egg, and brown slightly. Potatoes may be sprinkled with grated cheese before putting into oven.

MASHED POTATOES

Prepare boiled potatoes. When cooked and dried, add salt, butter, pepper, and cream (or hot milk) in following proportion:

1 pint potatoes
½ tsp. salt
1 tbsp. butter
⅛ tsp. white pepper
2 tsp. hot cream

Add the salt, pepper, and butter to the potatoes and mash, leaving them in saucepan on the stove to keep hot. Use an open-wire masher or fork and beat quickly, so they may be light and dry. Put in the cream or milk last, beat for a moment, and serve immediately.

Calories, 516: protein, 9 grams; fat, 14 grams; carbohydrate, 89 grams.

RICED POTATOES

Add salt and pepper to boiled potatoes and rub them through a heated potato ricer or squash strainer into the hot dish they are to be served in. Serve immediately, or pour a little milk over the top and brown in the oven.

1 medium, or ½ cup.—Calories, 85: protein, 2 grams; carbohydrate,

SPINACH

3 lb. spinach	¼ tsp. pepper
1 tbsp. salt	3 tbsp. butter

Wash the spinach through 5 or 6 waters, lifting plants out of water rather than draining off the water. Shakes the surplus water from the plants and put them into a granite utensil.

Cook covered without water over a slow fire. Turn often with a long-handled fork until enough juice is extracted to complete the cooking process, usually from 5 to 10 minutes.

Season with salt, pepper, and butter, and cut across several times with a sharp knife. Serve with hard-cooked eggs and acid or with a cheese sauce.

Calories, 610: protein, 26 grams; fat, 40 grams; carbohydrate, 36 grams.

STRING BEANS

Remove strings from beans and cut or snap into inch pieces. Wash and cook in boiling salted water 20 to 30 minutes, or until tender. Drain and season with butter and salt.

100 grams, ½ cup, cooked.—Calories, 25: protein, 2 grams; carbohydrate, 5 grams.

BAKED TOMATOES

Wash, dry, and remove a thin slice from the stem end of each tomato. Remove seeds and pulp and drain off most of the liquid. Add an equal quantity of cracker crumbs to the pulp, season with salt and pepper, and a little chopped onion or a few drops of onion juice. Refill the tomatoes with

the mixture and place in a buttered tin. Sprinkle with buttered cracker crumbs and bake 20 to 30 minutes in a moderate (350° F.) oven.

1 medium tomato, baked—Calories, 23: protein, 1 gram; carbohydrate, 4 grams.

SCALLOPED TOMATOES

1 large ripe tomato
Salt and pepper
Bread crumbs
2 tsp. butter

Place a layer of bread crumbs in a well-buttered individual baking dish. Cover with half of the tomato, peeled and cut into small pieces, and season well with salt, pepper, and bits of butter. Add another layer of crumbs, then the remaining tomato and seasoning, lastly crumbs. Place bits of butter on top, put into slow oven, and bake 20 to 30 minutes.

STEWED TOMATOES

Either canned or fresh tomatoes may be used. To prepare fresh tomatoes, wash, pour boiling water over them, and then peel and cut into pieces. Cook slowly 10 to 20 minutes, stirring occasionally. Add a few bread or cracker crumbs and season with butter, salt, and pepper. Bread and cracker crumbs may be omitted. A little sugar may be added if tomatoes are very acid.

1 cup canned tomato—Calories, 42: protein, 2 grams; carbohydrate, 8 grams.

100 grams, 1 medium cooked—Calories, 23: protein, 1 gram; carbohydrate, 4 grams.

142 grams, 1 large raw—Calories, 33: protein, 1 gram; fat, 1 gram; carbohydrate, 6 grams.

VEGETABLE SAUCES

CREAM OR WHITE SAUCE I

Use to pour over any vegetable
(Individual rule)

½ cup milk *or* thin cream
½ tbsp. butter
½ tbsp. flour
1/16 tsp. salt
Few grains white pepper

Scald the milk. Melt the butter in a saucepan, remove from stove, add the flour, then the scalded milk gradually. Cook, stirring constantly, until smooth and there is no taste of raw starch.

This sauce may be used with creamed oysters, sweetbreads, any creamed

dish, or any scalloped dish. If a thick sauce is desired, use 1 tablespoon of flour in place of ½.

Calories, with milk, 151: protein, 5 grams; fat, 11 grams; carbohydrate, 9 grams.

CREAM SAUCE II
(Individual rule)

½ cup milk *or* thin cream
½ tbsp. flour
1 tsp. butter
⅛ tsp. salt

Scald the cream. Wet the flour with a little cold milk to make a smooth mixture, and add to the hot cream. Cook well. Just before serving add the butter and salt, and pepper if desired.

If a thick sauce is desired, use 1 tablespoon of flour in place of ½.

Calories, with cream, 300: protein, 4 grams; fat, 28 grams; carbohydrate, 8 grams.

PARSLEY BUTTER

1 tbsp. butter
1 tsp. chopped parsley
Juice of ½ lemon

Cream the butter, add the lemon juice and chopped parsley. Omit the lemon juice if desired.

Calories, 110: fat, 12 grams.

APPENDIX

TABLE I

NUTRITIVE VALUES OF THE EDIBLE PORTION OF AVERAGE SERVINGS OF COMMON FOODS

Different samples of any food may show significant variations in composition as regards any one or all of the various food constituents. The method of analysis used may also be responsible for some variations noted in values given by different authorities. The values presented in this table for the various constituents of foods represent a selection from several sources and are intended for use in obtaining a fair approximation to the composition of the food items listed. The following are the chief sources of the values selected:

Protein, Fat, Carbohydrate and Energy Value

Chatfield, C., and Adams, G. *Proximate Composition of American Food Materials.* U. S. D. A. Circular No. 549, 1940.

Bureau of Human Nutrition and Home Economics and The National Research Council. *Table of Food Composition in Terms of Eleven Nutrients.* U. S. D. A. Miscellaneous Publication 572, 1945.

Taylor, C. M. *Food Values in Shares and Weights.* New York: The Macmillan Co., 1942.

Minerals

Bureau of Human Nutrition and Home Economics and The National Research Council. *Table of Food Composition in Terms of Eleven Nutrients.* U. S. D. A. Miscellaneous Publication 572, 1945.

Sherman, H. C. *Chemistry of Food and Nutrition,* 6th ed. New York: The Macmillan Co., 1942.

Vitamins

Munsell, H. E.: "Vitamin Content of Common Foods." Summary of published data to July, 1944 [unpublished].

Bureau of Human Nutrition and Home Economics and The National Research Council. *Table of Food Composition in Terms of Eleven Nutrients.* U. S. D. A. Miscellaneous Publication 572, 1945.

For explanation of vitamin units, see pages 41-42.

Fiber

CHATFIELD, C., and ADAMS, G. *Proximate Composition of American Food Materials.* U. S. D. A. Circular No. 549, 1940.

Acid and Base Reaction

BUREAU OF HUMAN NUTRITION AND HOME ECONOMICS. *Acid-forming Foods and Alkaline or Base-forming Foods.* U. S. D. A. Circular No. 411, 1935.

SANSUM, W. D., BLATHERWICK, N. R., and SMITH, F. H. "Use of Basic Diets in the Treatment of Nephritis." In *Journal American Medical Association,* 81 (1923), 883-886.

SHERMAN, H. C. *Chemistry of Food and Nutrition,* 6th ed. New York: The Macmillan Co., 1942.

SHERMAN, H. C., and GETTLER, A. O. "The Balance of Acid-forming and Base-forming Elements in Foods and Its Relation to Ammonia Metabolism." In *Journal Biological Chemistry,* 11 (1912), 323-328.

The values given should be interpreted as the volume in ml. or c.c. of normal acid or base required per 100 grams of food to titrate to neutrality.

The ash of cranberries and prunes is alkaline in nature, but because of the unoxidizable acid contained by them they increase the acidity of the urine and are classified as acid-forming.

Purins

BRIDGES, M. A. *Dietetics for the Clinician,* 4th ed. New York: The Macmillan Co., 1941.

A plus (+) sign is used to indicate those foods that contain purins.
For further information, see pages 689 and 690.

Approximate Measure Spoonfuls are level unless otherwise stated. "Cup" means a standard measuring cup equivalent to 16 level or 8 rounded tablespoons.

Weight For most vegetables and some other foods the weight given refers to the uncooked edible portion, although the measure is for the cooked product.

Abbreviations:

A.P.—as purchased	hp.—heaping	sm.—small
av.—average	med.—medium	sq.—square
c.—cup	pt.—pint	tbsp.—tablespoon
diam.—diameter	r.—rounding	tsp.—teaspoon
E.P.—edible portion	sc.—scant	

Table I. Nutritive Values of the Edible Portion of Average Servings of Common Foods

Food Material	Approximate Measure	Weights	Energy Value	Protein	Fat	Carbohydrate	Calcium	Iron	Vitamin A	Ascorbic Acid	Thiamine	Riboflavin	Niacin	Fiber	Reaction: Acid	Reaction: Base	Purin Value
		grams	Cal.	grams	grams	grams	grams	grams	I. U.	m gm.	mcgm.	mcgm.	mcgm.	%			
A																	
Abalone	½ c. or 1 piece 4"x1½"x1"	100	100	21.7	0.5	2.4	.024	.0012	...	...	...	...	...	...	...	...	...
Almonds	30 nuts, med.	30	102	5.6	16.2	5.0	.075	.0013	23	0	75	90	1380	2.7	0	12.3	0
	10 nuts, med.	10	64	1.9	5.4	2.0	.025	.0004	8	0	25	30	400	2.7	0	+	0
Apples	1 med.	100	64	0.3	0.4	14.0	.006	.0003	75	6	30	15	200	1.0	0	3.0	0
baked without sugar	1 sm.	100	64	0.3	0.4	14.0	.006	.0003	...	...	...	...	...	1.0	0	+	0
baked with sugar	1 sm. + 1 tbsp. sugar	100	116	0.3	0.4	27.0	.006	.0030	...	...	...	...	...	1.0	0	+	0
dried	½ c.	100	307	1.4	1.0	73.2	.020	.0015	350	15	40	60	500	4.0	0	+	0
Applesauce																	
cooked or canned without sugar, sauce	½ c. sc.	100	40	0.2	0.2	10.0	.004	.0002	60	1	10	10	...	0.6	0	+	0
cooked or canned with sugar, sauce	½ c. sc. + 1 tbsp. sugar	100	98	0.2	0.2	23.0	.004	.0002	60	2	10	10	...	0.6	0	+	0
Apricots	3 med.	100	50	1.0	0.1	12.0	.016	.0005	4000	7	45	50	700	0.6	0	6.8	0
canned, juice pack	6 halves	100	35	0.5	0.2	11.8	.016	.0005	4000	...	...	...	...	0.3	0	+	0
cooked or canned in syrup	6 halves	100	89	0.6	0.1	21.4	.015	.0003	1500	3	30	25	300	0.6	0	7.7	0
dried, A. P.	8 sm. halves or ¼ c.	50	140	2.6	0.2	33.5	.043	.0025	3500	3	45	65	1000	3.2	0	30.6	0
dried, cooked	⅓ c.	100	107	1.3	0.1	25.1	.022	.0012	...	...	...	...	...	0.6	0	17.4	0
Artichokes, French	2, 3" in diam.	100	63	2.9	0.4	11.0	.030	.0010	200	0	75	30	...	3.2	...	...	0
Artichokes, Jerusalem	1 large	100	78	2.2	0.1	17.0	...	...	...	7	60	...	...	0.8	...	...	0
cooked	1 large	100	77	2.0	0.1	16.0[1]	...	...	...	...	...	...	...	...	...	...	0
Asparagus, green	8 stalks, 4" long	100	26	2.2	0.2	3.9	.021	.0009	900	40	180	120	700	0.7	0	0.8	+
bleached	8 stalks, 4" long	100	26	2.2	0.2	3.9	...	...	0-50	30	180	...	...	0.7	0	0.8	+
green, canned	10 tips or ½ c.	100	21	1.6	0.3	3.0	.021	.0009	...	...	...	...	...	0.5	0	.08	+

[1]chiefly inulin.

Table 1. Nutritive Values of the Edible Portion of Average Servings of Common Foods (Continued)

Food Material	Approximate Measure	Weights	Energy Value	Protein	Fat	Carbohydrate	Calcium	Iron	Vitamin A	Ascorbic Acid	Thiamine	Riboflavin	Niacin	Fiber	Reaction Acid	Reaction Base	Purin Value
		grams	Cal.	grams	grams	grams	grams	grams	I. U.	m gm.	mcgm.	mcgm.	mcgm.	%			
Avocados	½ sm.	100	265	1.7	26.4	5.1	.010	.0006	400	12	100	90	900	1.8	0	5.7	0
B																	
Bacon, medium fat	1 slice	10	63	0.9	6.5	(0.1)	.001	.0001	.....	.....	(200)	150	2500	0	5.0	0	+
crisp, drained	15 slices, long, thin	100	567	18.0	52.0	.....	.012	.001	.....	.....	.....	.....	.....	0	+	0	+
crisp, drained	1½ slices, long, thick	20	113	3.6	10.4	.....	.002	.0002	.....	.....	.....	.....	.....	0	+	0	+
crisp, drained	1½ slices, long, thin	10	57	1.8	5.2	.....	.001	.0001	.....	.....	.....	.....	.....	0	+	0	+
drippings	1 tbsp	15	135	0	15	0	.....	.....	.....	.....	.....	.....	.....	0	.....	.....	+
Bananas, E. P.	1 med.	100	99	1.2	0.2	23.0	.008	.0006	350	10	50	75	600	0.6	0	8.0	0
Barley, pearled	3 tbsp	30	107	3.3	0.3	23.6	.005	.0006	0	0	100	.....	.....	0.8	10.4	0	0
whole grain	3 tbsp	30	108	3.8	0.6	21.8	.023	.0015	0	0	150	36	1500	2.7	+	0	0
Bass (see Fish).																	
Beans, pods, fresh																	
runner	⅔ c.	100	28	1.4	0.1	5.5	.....	.....	.....	.....	.....	.....	.....	.8	.....	.....	.....
snap, green	⅔ c.	100	42	2.4	0.2	7.7	.065	.0011	1500	25	75	110	500	1.4	0	5.0	+
snap, green, canned	⅔ c.	100	19	1.0	0	3.8	.027	.0014	410	4	30	50	300	.....	.....	.....	.....
snap, wax	⅔ c.	100	42	2.4	0.2	7.7	.065	.0011	300	25	75	100	600	1.4	0	5.0	+
Beans, shelled, fresh																	
lima	½ c. or 4 r. tbsp	100	131	7.5	0.8	23.5	.063	.0023	500	30	300	150	900	1.5	0	14.0	+
lima, canned	½ c. or 4 r. tbsp	100	72	3.8	0.3	13.5	.027	.0017	130	8	30	50	500	.....	.....	.....	.....
runner	½ c.	100	.....	.....	.....	.....	.....	.....	500	25	300	.....	.....	.....	.....	.....	.....
soybeans	½ c.	100	132	12.5	6.5	6.0	.....	.....	200	35	500	300	2000	2.0	.....	++	+
Beans, shelled, dried																	
lima, A. P.	3 tbsp	30	102	6.2	0.4	18.5	.020	.0023	30	0	158	225	450	4.3	0	41.7	+
lima, cooked	⅓ c.	80	102	6.2	0.4	18.5	.020	.0023	.....	.....	.....	.....	.....	.....	0	+	+

Table 1. Nutritive Values of the Edible Portion of Average Servings of Common Foods (Continued)

FOOD MATERIAL	APPROXIMATE MEASURE	WEIGHTS	ENERGY VALUE	PROTEIN	FAT	CARBOHYDRATE	CALCIUM	IRON	VITAMIN A	ASCORBIC ACID	THIAMINE	RIBOFLAVIN	NIACIN	FIBER	REACTION		PURIN VALUE
															ACID	BASE	
		grams	Cal.	grams	grams	grams	grams	grams	I. U.	m gm.	mcgm.	mcgm.	mcgm.	%			
Beans, shelled, dried																	
navy, A. P.	3 tbsp.	30	105	7.0	0.5	18.6	.044	.0031	0	0	153	98	450	3.9	0	10.0	+
navy, cooked	½ c.	100	131	8.8	0.6	23.3	.055	.0039	...	...	...	...	...	1.4	0	+	+
navy, baked, canned	⅓ c. or 4 r. tbsp	100	117	5.7	2.0	19.0	.049	.0030	...	...	...	...	...	2.5	0	+	+
red kidney, A. P.	3 tbsp.	30	105	6.6	0.5	18.6	.044	.0031	...	0	135	60	600	...	...	...	...
canned	½ c.	100	105	6.6	0.5	18.6	.044	.0031	...	...	...	...	...	0.9	0	+	+
soybeans, A. P.	3 tbsp.	30	105	10.5	5.4	3.6	.068	.0024	30	0	360	225	750	5.0	...	...	+
Beef:																	
brains	2 oz. ⅔	50	64	5.2	4.4	0.7	.002	.0006	...	...	...	...	...	0	0	+	+
broth	½ c.	100	17	2.0	1.0	0	...	...	...	...	...	...	...	0	...	...	+
heart	1 slice, 2"x3"x1"	100	104	16.9	3.7	0.7	.010	.0062	200	...	600	900	6000	0	7.7	0	+
juice	½ c.	100	30	5.0	1.0	0	...	...	...	...	...	...	...	0	+	0	+
kidney	½ c. cubed	100	136	15.0	8.1	0.9	.016	.0065	1000	...	250	2100	6500	0	+	0	+
liver	3 slices, 2"x1"x¼"	100	132	19.7	3.2	6.0	.008	.0121	30000	fresh 37	400	3000	18000	0	10.3	0	+
liver	1 slice, 2"x1"x¼"	30	40	5.9	1.0	1.8	.002	.0036	9000	fresh 11	120	900	5400	0	+	0	+
marrow, A. P.	3 pieces, 2½" long, 1" diam	100	845	2.0	93.0	0	...	...	...	...	...	...	...	0	...	...	...
Beef muscle, raw, lean	1 slice, round, 2½"x2½"x1"	100	194	99.3	13.0	0	.013	.0030	20	0	125	225	4500	0	12.0	0	+
	¼ c. chopped or 2 cakes	60	116	11.6	7.8	0	.008	.0018	12	0	75	135	2700	0	+	0	+
roast, rib	4 slices, 4½"x2½"x⅛	100	277	17.4	23.0	0	.010	.0026	12	0	120	220	4500	0	+	0	+
roast, rump	1 slice, 4½"x2½"x¼"	50	170	7.7	15.5	0	.004	.0011	10	0	62	112	2200	0	+	0	+

Table 1. Nutritive Values of the Edible Portion of Average Servings of Common Foods (Continued)

Food Material	Approximate Measure	Weights	Energy Value	Protein	Fat	Carbohydrate	Calcium	Iron	Vitamin A	Ascorbic Acid	Thiamine	Riboflavin	Niacin	Fiber	Reaction: Acid	Reaction: Base	Purin Value
		grams	Cal.	grams	grams	grams	grams	grams	I. U.	m gm.	mcgm.	mcgm.	mcgm.	%			
Beef, muscle, raw, lean																	
scraped	2 tbsp.	30	58	5.8	3.9	0	.003	.0009	......	......	......	......	......	0	+	0	+
muscle, lean, **corned**	1 slice, 4"x3"x1"	100	191	18.4	13.0	0	.011	.0028	0	0	60	112	1700	0	12.6	0	+
dried	6 slices, thick, 4"x5"	100	194	34.3	6.3	0	.011	.0028	0	0	100	220	3700	0	14.8	0	+
dried	2 slices, thin, 4"x5"	30	58	10.3	1.9	0	.003	.0008	0	0	30	66	1110	0	+	0	+
suet, medium fat	1" cube	15	127	0.26	14.0	0	......	......	120	......	......	......	......	0	......	0	0
tongue, medium fat	5 slices	100	202	16.4	15.0	0.4	.030	.0069	......	......	220	270	7000	0	+	......	+
tongue, canned	5 slices	100	261	19.3	20.3	0.3	.032	.0075	......	......	......	......	......	0	+	......	+
tongue, canned	2 slices	40	104	7.7	8.1	0.1	.013	.0030	......	......	......	......	......	0	+	......	+
tongue, pickled, E. P	5 slices	100	261	19.3	20.3	0.3	.032	.0075	......	......	......	......	......	0	......	......	+
tongue, pickled	2 slices	40	104	7.7	8.1	0.1	.013	.0030	......	......	......	......	......	0	......	......	+
Beet greens	⅝ c. or 3 hp. tbsp. cooked	100	33	2.0	0.3	5.6	.134	.0032	15000	45	45	300	600	1.4	0	27.0	0
Beets	2, 2" in diam., ½ c., diced	100	46	1.6	0.1	9.6	.026	.0010	0	15	30	50	500	0.9	0	10.0	0
cooked	½ c., diced	100	42	1.6	0.1	8.5	......	......	......	......	......	......	......	0.9	0	11.4	0
Blackberries, A. P.	½ c. or 25 berries 1" long	100	62	1.2	1.1	11.9	.032	.0009	75	7	30	......	......	4.1	0	4.3	0
canned, without sugar	½ c. and 3 tbsp. liquid	100	51	0.8	0.3	11.3	......	......	......	......	......	......	......	2.8	0	+	0
canned with sugar	½ c. and 3 tbsp. juice	100	86	0.7	0.7	19.1	......	......	......	......	......	......	......	2.5	0	+	0
Blueberries, A. P.	⅔ c. sc.	100	68	0.6	0.6	15.1	.016	.0009	50	10	30	(70)	(300)	1.2	0	2.5	0
canned without sugar	½ c. + 2 tbsp. liquid	100	49	0.4	0.4	11.0	......	......	......	......	......	......	......	1.0	0	+	0

Table 1. Nutritive Values of the Edible Portion of Average Servings of Common Foods (Continued)

FOOD MATERIAL	APPROXIMATE MEASURE	WEIGHTS	ENERGY VALUE	PROTEIN	FAT	CARBOHYDRATE	CALCIUM	IRON	VITAMIN A	ASCORBIC ACID	THIAMINE	RIBOFLAVIN	NIACIN	FIBER	REACTION		PURIN VALUE
															ACID	BASE	
		grams	Cal.	grams	grams	grams	grams	grams	I. U.	m gm.	mcgm.	mcgm.	mcgm.	%			
Blueberries, A. P.																	
canned with sugar	½ c. or 8 tbsp.	100	109	0.4	0.4	26.0	.....	.....	.....	.....	.....	.....	.....	1.0	0	+	0
Bluefish (see Fish)																	
Bouillon	½ c. sc.	100	4	0	0	.....	.....	.....	.....	.....	.....	.....	.....	0	.....	.....	.....
cube, A. P.	3⅓ oz.	100	259	17.7	0	47.0	.040	.0092	0	0	30	830	600	0	.....	.....	+
cube, prepared	1 cube(4 grams) in 1 c. water	235	10	0.7	0	1.9	.002	.0004	.....	.....	.....	.....	.....	0	.....	.....	+
Brains (see Beef)																	
Bran, packaged	½ c.	33	122	5.3	1.4	22.1	.....	.....	.....	.....	.....	117	6665	8.4	.....	.....	0
flakes	2 tbsp.	10	37	1.3	0.2	7.5	.....	.....	.....	.....	.....	.....	.....	3.1	.....	.....	0
Brazil nuts	4 nuts, med.	30	209	4.3	19.8	3.3	.037	.0008	3	.....	150	.....	.....	2.1	0	10.9	0
Bread:																	
Boston brown	1 slice, sm.	30	62	1.5	0.8	12.4	.039	.0009	.....	.....	.....	.....	.....	0.5	5.4	0	0
corn	1 piece, 2½"x 4"x1"	33	88	2.2	2.4	14.5	.018	.0002	.....	.....	.....	.....	.....	.....	6.0	0	0
French rolls	1 roll	40	145	3.4	0.4	22.1	.....	.....	.....	.....	.....	.....	.....	0.3	5.2	0	0
gluten	1 slice, sm.	30	77	7.5	1.1	9.1	.....	.....	.....	.....	.....	.....	.....	0.3	+	0	0
graham, made with milk	1 slice, 3"x 3½"x½"	30	79	3.0	1.2	14.1	.015	.0008	.....	0	63	45	840	1.0	6.8	0	0
rye, half rye, half white flour	1 slice, 3"x 3½"x½"	30	76	2.7	0.6	14.9	.007	.0005	.....	0	63	.....	.....	0.5	6.8	0	0
rye, pumpernickel	1 slice, 3¾"x 3¾"x⅛"	30	71	2.0	0.4	14.9	.....	.....	.....	.....	.....	.....	.....	1.3	.....	.....	.....
white, milk	1 slice, 3"x3½" x½"	30	80	2.7	1.1	14.9	.019	.0002	.....	.....	.....	.....	.....	0.3	7.1	0	0

Table 1. Nutritive Values of the Edible Portion of Average Servings of Common Foods (Continued)

FOOD MATERIAL	APPROXIMATE MEASURE	WEIGHTS	ENERGY VALUE	PROTEIN	FAT	CARBOHYDRATE	CALCIUM	IRON	VITAMIN A	ASCORBIC ACID	THIAMINE	RIBOFLAVIN	NIACIN	FIBER	REACTION		PURIN VALUE
															ACID	BASE	
		grams	Cal.	grams	grams	grams	grams	grams	I. U.	m gm.	mcgm.	mcgm.	mcgm.	%			
Bread:																	
white, commercial, some milk	1 slice, 3″x3½″ x½″	30	78	2.6	0.6	15.7	.014	.0002	......	0	20	39	190	0.3	6.0	0	0
white, commercial, some milk, enriched	1 slice, 3″x3½″ x½″	30	78	2.6	0.6	15.7	.017	.0005	0	0	72	45	660	0.3	.....	0	0
whole wheat, made with some milk	1 slice, 3″x3½″ x½″	30	79	2.9	1.1	14.4	.020	.0009	......	0	63	45	840	1.0	7.3	0	0
zwieback	1 piece	10	42	1.1	0.9	7.4	......	......	......	......	......	......	......	0.3	+	....	0
Broccoli	¾ c.	100	37	3.3	0.2	5.5	.130	.0014	9000	125	90	240	1000	1.3	0	4.2	0
Brussel sprouts	⅔ c. or 9 med.	100	58	4.4	0.5	8.9	.034	.0011	500	95	150	(60)	(300)	1.3	0	4.3	0
Butter	1 c.	227	1664	1.4	183.9	0.9	.036	.0005	7491	0	0	23	227	0	0	0	0
	7 tbsp.	100	733	0.6	81.0	0.5	.016	.0002	3300	0	0	10	100	0	0	0	0
	1 tbsp.	15	110	0.1	12.2	0.1	.002	0	495	0	0	2	15	0	0	0	0
	2 tsp.	10	73	0.1	8.1	0	.002	0	330	0	0	1	10	0	0	0	0
	1 tsp.	5	37	0	4.0	0	.001	0	165	0	0	0	5	0	0	0	0
Butterfish (see Fish)																	
Buttermilk	1 glass	218	81	7.6	1.1	10.0	.257	.0002	44	0	87	370	218	0	0	+	0
	½ c. sc.	100	37	3.5	0.5	4.6	.118	.0001	20	0	40	170	100	0	0	2.2	0
Butternuts	6 or 7 nuts	20	136	4.9	12.2	1.7	......	......	......	......	......	......	......	......	......	......	......
C																	
Cabbage, head, green	¾ c. shredded; ⅔ c. cooked	50	15	0.7	0.1	2.7	.214	.0009	75	30	38	35	110	1.0	0	4.5	0
head, bleached	¾ c. shredded	50	15	0.7	0.1	2.7	.023	.0002	0	30	38	25	150	1.0	0	+	0
Chinese	¾ c. shredded	50	8	0.7	0.1	1.2	.026	.0005	4500	23	15	23	......	0.6	0	+	0

Table 1. Nutritive Values of the Edible Portion of Average Servings of Common Foods (Continued)

FOOD MATERIAL	APPROXIMATE MEASURE	WEIGHTS	ENERGY VALUE	PROTEIN	FAT	CARBOHYDRATE	CALCIUM	IRON	VITAMIN A	ASCORBIC ACID	THIAMINE	RIBOFLAVIN	NIACIN	FIBER	REACTION ACID	REACTION BASE	PURIN VALUE
		grams	Cal.	grams	grams	grams	grams	grams	I. U.	m gm.	mcgm.	mcgm.	mcgm.	%			
Calves' foot jelly. A.P.	4 r. tbsp.	100	87	4.0	0	17.0	......	......	......	......	......	......	......	......	......	......	......
Cantaloupe	½ melon, 5″ diam.	200	46	1.2	0.4	9.2	.034	.0008	2000	60	100	100	2000	0.6	0	7.0	0
	½ c. balls ⅝″ diam.	E. P. 100	23	0.6	0.2	4.6	.017	.0004	1000	30	50	50	1000	0.6	0	7.0	0
Carrots, fresh	¾ c. cubed or 1 large	100	45	1.2	0.3	9.3	.042	.0007	10000	6	65	60	500	1.1	0	14.0	0
canned	⅔ c. cubed	100	30	0.5	0.4	6.1	.022	.0006	10000	2	30	20	300	1.0	0	+	0
Cauliflower, fresh	⅔ c. or ¾ cooked	100	31	2.4	0.2	4.9	.022	.0011	50	75	150	125	600	0.9	0	5.3	0
canned	¾ c.	100	18	1.0	0.2	3.0	......	......	......	......	......	......	......	0.6	0	+	0
Caviar	2 tsp.	20	49	5.4	3.0	0	.027	......	......	......	......	......	......	......	......	......	......
Celery, stalks, green	4 stalks or ¾ c. cooked	100	22	1.3	0.2	3.7	.072	.0007	1000	5	30	100	300	0.7	0	7.7	0
bleached, hearts	1 heart, large	100	22	1.3	0.2	3.7	.050	.0005	10	5	30	35	200	0.7	0	7.7	0
Celery root (celeriac)	4 r. tbsp.	100	45	1.7	0.3	8.8	......	......	......	......	......	......	......	1.4	0	+	0
Chard	3⅓ oz. or ¾ c. cooked	100	25	1.4	0.2	4.4	.104[1]	.0040	10000	35	60	125	200	0.9	0	15.8	0
Cheese																	
American Cheddar	3 cubes, 1½″ sq	100	393	23.9	32.3	1.7	.873	.0010	1500	0	40	500	30	0	5.4	0	0
	1 cube, 1½″ sq.	30	118	7.2	9.7	0.5	.262	.0003	450	0	12	150	9	0	+	0	0
	1 cube, 1″ sq.	20	79	4.8	6.5	0.3	.175	.0002	300	0	8	100	6	0	+	0	0
Camembert	3⅓ oz.	100	306	19.7	25.2	0	......	......	......	......	75	650	300	0	+	0	0
	1 oz.	30	92	5.9	7.6	0	......	......	......	......	23	195	90	0	+	0	0
cottage	⅔ c.	100	101	19.2	0.8	4.3	.082	.0010	175	0	20	280	100	0	......	......	0
	2 tbsp.	20	20	3.8	0.2	0.9	.016	.0002	35	0	4	56	20	0	......	......	0

[1]not nutritionally available.

Table 1. Nutritive Values of the Edible Portion of Average Servings of Common Foods (Continued)

FOOD MATERIAL	APPROXIMATE MEASURE	WEIGHTS	ENERGY VALUE	PROTEIN	FAT	CARBOHYDRATE	CALCIUM	IRON	VITAMIN A	ASCORBIC ACID	THIAMINE	RIBOFLAVIN	NIACIN	FIBER	REACTION ACID	REACTION BASE	PURIN VALUE
		grams	Cal.	grams	grams	grams	grams	grams	I. U.	m gm.	mcgm.	mcgm.	mcgm.	%			
Cheese																	
cream	6 tbsp.	100	367	7.1	36.9	1.7	.298	.0010	2000	0	10	140	100	0	.....	.....	.....
	2 tbsp.	30	110	2.1	11.1	0.5	.089	.0003	600	0	3	42	30	0	.....	.....	.....
Edam	1 oz.	30	92	8.1	6.0	1.2	.....	.....	.....	.....	.....	.....	.....	.....	+	0	0
Limberger	.....	100	388	23.5	32.4	0.7	.....	.....	.....	.....	80	475	100	0	+	0	.....
Neufchâtel	6 tbsp. or 1¼ pkg.	100	367	7.1	36.9	1.7	.298	.0010	2000	0	10	140	100	0	.....	.....	0
	¼ roll	20	73	1.4	7.4	0.3	.060	.0002	400	0	2	28	20	0	.....	.....	0
Parmesan	1¼ c. grated	100	401	36.3	27.4	2.3	.....	.....	1500	0	30	550	110	0	.....	.....	0
pot	½ c.	100	194	28.0	9.0	0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	2 tbsp.	25	49	7.0	2.3	0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Roquefort	5 triangles	100	391	21.7	33.2	1.4	.727	.0010	.....	.....	.....	450	.....	0	.....	.....	0
	1 triangle	20	78	4.3	6.6	0.3	.145	.0002	.....	.....	.....	90	.....	0	.....	.....	0
Swiss	6 slices, med.	100	404	28.6	31.3	1.9	1.100	.0012	.....	.....	30	500	70	0	+	.....	0
	1 slice, thin	20	81	5.7	6.3	0.4	.220	.0002	.....	.....	6	100	14	0	+	.....	0
Cherries, fresh, E. P.	25 sm.	100 E. P.	68	1.1	0.5	14.8	.017	.0005	150	8	45	.....	130	0.3	0	6.1	0
canned, juice pack,	25 sm. or 12 lg.	100 E. P.	57	0.8	0.4	12.6	0	.....	.....	.....	.....	.....	.....	0.2	0	5.7	0
canned, in syrup,	25 sm. or 12 lg.	100	86	0.6	0.1	20.8	(.011)	.0003	150	3	30	20	200	0.2	0	.....	0
Chestnuts, dried	20 nuts	50	189	3.4	2.0	39.3	.017	.0004	.....	.....	.....	.....	.....	2.5	0	7.4	0
Chicken muscle, dark	1 leg, meat only	100	126	21.0	4.7	0	.016	.0019	.....	fresh 2.5	150	260	5000	0	+	0	+
light	½ breast, av.	100	122	23.3	3.2	0	(.016)	(.0019)	.....	fresh 1.0	90	130	10000	0	+	0	+
broiler, flesh only	½ med.	with bone 130	122	20.6	4.4	0	(.016)	.0019)	.....	.....	110	180	8600	0	10.7	0	+

Table 1. Nutritive Values of the Edible Portion of Average Servings of Common Foods (Continued)

Food Material	Approximate Measure	Weights	Energy Value	Protein	Fat	Carbohydrate	Calcium	Iron	Vitamin A	Ascorbic Acid	Thiamine	Riboflavin	Niacin	Fiber	Reaction: Acid	Reaction: Base	Purin Value
		grams	Cal.	grams	grams	grams	grams	grams	I. U.	m gm.	mcgm.	mcgm.	mcgm.	%			
Chicken																	
fryer or roaster	2 slices, 4″x″4″ x⅛″	100	125	20.8	4.7	0	(.016)	(.0019)	......	......	110	180	8600	0	+	0	+
mature fowl	2 slices, 4″x4″ x⅛″	100	149	21.3	7.1	0	.016	.0019	......	......	110	180	8600	0	+	0	+
gizzard	3⅓ oz.	100	129	23.1	3.8	0.6	......	......	......	......	......	......	......	0	19.7	0	+
heart	3⅓ oz.	100	151	20.5	7.0	1.6	......	......	......	......	......	......	......	0	16.6	0	+
liver	3⅓ oz.	100	135	22.1	4.0	2.6	.008	.0121	24000	fresh 35	400	2500	18000	0	17.9	0	+
Chocolate, bitter, unsweetened	1 sq.	30	......	(1.7)	15.9	(5.4)	0	.0008	......	......	......	......	......	2.6	6.7	0	+
sweetened, milk	1 bar	100	542	6.0	33.5	54	.095	.0025	......	......	......	......	......	0.5	+	0	+
Citron, candied	1 oz.	30	97	0.1	0.1	24.1	.036	......	......	......	......	......	......	1.4	0	9.0	0
Clams, long, meat only	4 clams, med.	100	78	13.6	1.7	2.1	.102	.004	200	......	25	......	1000	0	+	0	+
meat and liquor	2 clams	100	51	8.6	1.0	2.0	......	......	......	......	......	......	......	0	+	0	+
round, meat only	6 clams, med.	100	76	11.1	0.9	5.9	.102	.004	200	......	25	......	1000	0	+	0	+
meat and liquor	3 clams	100	46	6.5	0.4	4.2	......	......	......	......	......	......	......	0	+	0	+
Cocoa, dry, A. P.	1 tbsp.	7	23	0.6	1.3	2.2	.008	.0002	......	......	......	......	......	4.8	0	4.3	+
Coconut, fresh, meat only	1 slice, 2″x2″ x½″	30	115	1.0	10.4	4.2	.006	.0006	0	0	......	......	......	3.2	0	7.0	0
dried, shredded	¼ c.	20	116	0.6	7.8	9.9	.009	.0007	0	0	tr	tr	tr	4.1	0	4.2	0
Cod (see Fish)																	
Collards	½ c. cooked	100	50	3.9	0.6	7.2	.249	.0016	12000	60	80	300	800	1.2	0	+	0
Consommé	½ c.	100	4	1.0	0	0	......	......	......	......	......	......	......	0	......	......	+
Corn, sweet, white	⅜ c. or 1 med. ear	100	108	3.7	1.2	20.5	.009	.0005	25	10	135	......	1000	0.8	1.8	0	0

Table 1. Nutritive Values of the Edible Portion of Average Servings of Common Foods (Continued)

FOOD MATERIAL	APPROXIMATE MEASURE	WEIGHTS	ENERGY VALUE	PROTEIN	FAT	CARBOHYDRATE	CALCIUM	IRON	VITAMIN A	ASCORBIC ACID	THIAMINE	RIBOFLAVIN	NIACIN	FIBER	REACTION		PURIN VALUE
															ACID	BASE	
		grams	Cal.	grams	grams	grams	grams	grams	I. U.	m gm.	mcgm.	mcgm.	mcgm.	%			
Corn																	
yellow	3/8 c. or 1 med. ear	100	108	3.7	1.2	20.5	.009	.0005	600	10	135	140	1700	0.8	1.8	0	0
canned, sweet	4 tbsp.	100	77	2.0	0.5	16.1	.004	.0005	yellow 200	5	20	50	800	0.4	1.8	0	0
Corn flakes	1/2 c.	15	54	1.2	0.1	12.0	.002	.0002	0	0	24	12	240	0.5	5.3	0	0
Cornmeal, dry, white	4 tbsp.[1]	30	107	2.3	0.3	23.6	.003	.0003	0	0	48	27	270	0.8	5.3	0	0
	2 2/3 tbsp.[2]	20	71	1.5	0.2	15.8	.002	.0002	0	0	32	18	180	0.8	+	0	0
dry, yellow	4 tbsp.[1]	30	107	2.5	0.4	23.4	.003	.0003	90	0	45	18	270	0.7	+	0	0
	2 2/3 tbsp.[2]	20	71	1.7	0.2	15.6	.002	.0002	60	0	30	12	180	0.7	+	0	0
Cornstarch, dry	1 tbsp.	10	35	0.1	0	8.7	tr	tr	0	0	(o)	(o)	(o)	0.7	...	...	0
Corn syrup	2 tbsp.	30	89	...	...	220	...	...	0	0	0	0	...	...	...	...	...
Cowpeas, fresh	1/2 c.	100	134	9.4	0.6	22.7	...	...	500	35	400	300	...	...	...	...	...
dried	3 tbsp.	30	105	6.9	0.4	18.5	.024	.0023	30	0	180	60	540	4.2	0	+	+
Crabmeat, canned	2 r. tbsp.	40	40	6.8	1.2	0.5	.007	.0004	...	...	...	...	...	...	...	...	...
Crabs, cooked	1 crab	75	61	12.1	1.2	0.5	.013	.0007	...	...	...	...	...	...	...	...	...
Crackermeal	1/4 c.	30	127	2.9	3.1	21.8	.006	.0005	0	0	21	0	180	0.2	+	0	0
Crackers																	
butter	2 crackers 2″ diam.	6	26	0.6	0.7	4.2	...	...	...	...	...	...	...	0.3	...	...	...
cheese	16 tidbits	25	111	3.9	4.1	14.6	...	...	...	...	...	...	...	0.1	...	...	...
graham	1, 3″ sq.	8	36	0.6	0.8	5.9	.002	.0002	0	0	24	10	120	0.8	8.5	0	0
Matzoth	1 round tea	20	69	3.0	0	14.0	...	...	...	...	...	...	...	...	+	0	0
oatmeal	3, 2 3/8″ diam.	20	85	1.7	2.3	14.3	...	...	...	...	...	...	...	0.3	...	...	...
oyster	30 crackers	30	33	2.9	2.9	21.8	...	...	...	...	...	...	...	0.2	+	0	0
saltines	1	4	17	0.4	0.5	2.8	...	...	...	...	...	...	...	0.4	7.5	0	0
soda	1	6	25	0.6	...	0.6	...	...	...	...	...	...	...	0.2	8.3	0	0
Uneeda	1, 3″ sq.	6	22	0.5	0.5	4.0	...	...	...	...	...	...	...	0.8	+	0	0
unshortened	1	9	35	1.0	0	7.4	...	...	...	...	...	...	...	0.4	+	0	0

[1] Cooked with 1 1/4 c. water gives 3/4 c.

[2] Cooked with 5/6 c. water gives 1/2 c.

Table 1. Nutritive Values of the Edible Portion of Average Servings of Common Foods (Continued)

FOOD MATERIAL	APPROXIMATE MEASURE	WEIGHTS	ENERGY VALUE	PROTEIN	FAT	CARBOHYDRATE	CALCIUM	IRON	VITAMIN A	ASCORBIC ACID	THIAMINE	RIBOFLAVIN	NIACIN	FIBER	REACTION: ACID	REACTION: BASE	PURIN VALUE
		grams	Cal.	grams	grams	grams	grams	grams	I .U.	m gm.	mcgm.	mcgm.	mcgm.	%			
Crackers																	
whole wheat, wafers	1	3	14	0.3	0.3	2.6	....	....	....	....	....	....	....	0.8	+	0	0
Cranberries, fresh	⅔ c.	100	53	0.4	0.7	11.3	.014	.0006	30	12	....	....	130	1.4	0	3.2	0
cooked or canned, with sugar	⅔ c.	100	209	0.1	0.3	51.4	.008	.0003	30	2	....	(40)	....	0.4	0	+	0
Cranberry jelly	2 tbsp.	43	100	0.1	0.3	22.1	.004	.0001	10	1	....	....	....	....	0	+	0
Cream, 20% fat	1 c.	240	499	7.0	48	9.6	.233	.0024	1560	0	84	336	240	....	0	0	0
	½ c. sc.	100	208	2.7	20.0	4.0	.097	.0001	650	0	35	140	100	....	0	0	0
	2 tbsp.	30	62	0.9	6.0	1.2	.029	0	195	0	11	42	30	....	0	0	0
Cream, 40% fat	1 c.	240	917	5.5	96.0	7.7	.206	.0024	3120	0	....	....	....	....	0	0	0
	½ c. sc.	100	382	2.3	40.0	3.2	.086	.0001	1300	0	....	....	....	....	0	0	0
	2 tbsp.	30	115	0.7	12.0	1.0	.026	0	390	0	....	....	....	....	0	0	0
Cream of wheat, dry	4 tbsp.[1]	30	108	3.5	0.3	22.8	.006	.0002	0	0	18	18	300	0.3	9.5	0	0
	2⅔ tbsp.[2]	20	72	2.3	0.2	15.2	.004	.0002	0	0	12	12	200	0.3	+	....	....
Cucumber	½ med. or 10 med. slices	100	14	0.7	0.1	2.7	.010	.0003	20	8	30	25	200	0.5	0	7.9	0
Cucumber pickle, sour	1, 4"x1½"x1¼"	100	11	0.5	0.2	1.9	.024	.0009	190	7	10	20	....	0.4	0	+	0
Currants, red, white or black	1 c. sc.	100	61	1.6	0.4	12.7	.035	.0009	400	Black 150 Red 45	40	....	....	3.2	0	+	0
dried	½ c.	100	298	2.3	0.5	71.2	.075	.0027	0	0	100	30	450	....	0	5.9	0
D																	
Dandelion greens	½ c. cooked	100	52	2.7	0.7	8.8	.187	.0031	120000	36	190	140	800	1.8	0	19.5	0
Dates, fresh or cured	15 sm., pitted	100	316	2.2	0.6	75.4	.072	.0021	300	0	75	75	2000	2.4	0	9.0	0
	6 sm., pitted	40	124	0.8	0.2	30.2	.029	.0008	120	0	30	30	800	2.4	0	+	0
Dextri-maltose	4 tsp.	12	45	0	0	12	....	....	....	....	....	....	....	0	....	....	0
	3 tsp.	9	36	0	0	9	....	....	....	....	....	....	....	....	....	....	....

[1]Cooked with 1¼ c. water gives 14 hp. tbsp. or ¾ c.

[2]Cooked with ¾ c. water gives 9⅓ hp. tbsp. or ½ c.

Table 1. Nutritive Values of the Edible Portion of Average Servings of Common Foods (Continued)

Food Material	Approximate Measure	Weights	Energy Value	Protein	Fat	Carbohydrate	Calcium	Iron	Vitamin A	Ascorbic Acid	Thiamine	Riboflavin	Niacin	Fiber	Reaction: Acid	Reaction: Base	Purin Value
		grams	Cal.	grams	grams	grams	grams	grams	I. U.	m gm.	mcgm.	mcgm.	mcgm.	%			
Duck, muscle only....	2 slices, 1¾" x 1½"x¼"....	100	132	21.3	5.2	0	.016	.0020	......	......	......	......	......	0	14.6	0	+
	1 slice, 1¾"x 1"x¼"......	30	40	6.4	1.6	0	.005	.0006	......	......	......	......	......	0	+	0	+
E																	
Eggplant.............	½ c...........	100	28	1.1	0.2	5.5	.015	.0005	100	10	45	43	600	0.9	0	4.5	0
Eggs, whole, raw......	2 av..........	100	158	12.8	11.5	0.7	.054	.0027	1000	0	145	350	65	0	11.0	0	0
	1 av..........	50	79	6.4	5.8	0.4	.027	.0014	500	0	73	175	33	0	+	0	0
white, raw..........	1 av..........	28	13	3.0	0	0.2	.003	0	0	0	0	64	21	0	4.8	0	0
yolk, raw..........	1 av..........	16	57	2.6	5.1	0.1	.025	.0012	448	0	67	78	6	0	25.0	0	0
Endive..............	10 stalks......	100	24	1.6	0.2	4.0	.074	.0017	......	20	75	60	700	0.8	0	11.3	0
Escarole.............	4 leaves.......	100	21	1.6	0.3	2.9	.074	.0017	10000	15	50	200	......	0.8	0	+	0
F																	
Farina, dry..........	4 tbsp.[1].......	30	108	3.5	0.3	22.8	.006	.0002	0	0	18	18	30	0.3	9.5	0	0
	2⅔ tbsp.[2].....	20	72	2.3	0.2	15.2	.004	.0002	0	0	12	12	20	0.3	+	0	0
Figs, fresh...........	4 large or 8 sm.	100	88	1.4	0.4	19.6	.050	.0007	10	2	60	5	600	1.7	0	10.0	0
	1 large or 2 sm.	25	22	0.4	0.1	4.9	.013	.0002	3	0	15	1	150	1.7	0	+	0
cooked or canned without sugar.....	4 + juice.....	100	57	0.5	0.1	13.5	......	......	......	......	......	......	......	0.6	0	+	0
canned, in syrup....	4 + juice......	100	126	0.8	0.3	30.0	......	......	......	......	......	......	......	0.9	0	+	0
dried.............	6 pulled.......	100	300	4.0	1.2	68.4	.233	.0031	60	0	60	45	(1500)	5.8	0	28.3	0
	2 pulled, sm...	30	90	1.2	0.4	20.5	.070	.0009	18	0	18	14	450	5.8	0	+	0
Filberts.............	10 nuts........	10	67	1.3	6.1	1.8	.029	.0004	10	0	40	......	......	3.4	2.1	0	0
Finnan haddie (see Fish)																	

[1]Cooked with 1½ c. water gives 12 tbsp. or ¾ c.

[2]Cooked with ¾ c. water gives 8 tbsp. or ½ c.

Table 1. Nutritive Values of the Edible Portion of Average Servings of Common Foods (Continued)

Food Material	Approximate Measure	Weights	Energy Value	Protein	Fat	Carbohydrate	Calcium	Iron	Vitamin A	Ascorbic Acid	Thiamine	Riboflavin	Niacin	Fiber	Reaction: Acid	Reaction: Base	Purin Value
		grams	Cal.	grams	grams	grams	grams	grams	I. U.	m gm.	mcgm.	mcgm.	mcgm.	%			
Fish																	
bass	1 piece, 4"x1½"x1"	100	98	19.0	2.5	0	.021	.0010	......	(2)	70	70	4200	0	15.8	0	0
	1 piece, 1"x2¼"x1"	35[1]	34	6.7	0.9	0	.007	.0004	......	1	25	25	1470	0	+	0	0
bluefish	1 piece, 4"x1½"x1"	100	118	20.5	4.0	0	.022	.0011	......	(2)	70	70	4200	0	16.6	0	0
	1 piece, 1"x2¼"x1"	35[1]	41	7.2	1.4	0	.008	.0004	......	(1)	25	25	1470	0	+	0	0
butterfish, raw	1 piece, 4"x1½"x1"	100	164	18.1	10.2	0	.020	.0010	......	......	......	......	......	0	+	0	+
	1 piece, 1"x2¼"x1"	35[1]	57	6.3	3.6	0	.007	.0004	......	......	......	......	......	0	+	0	+
cod, steak	1 piece, 4"x1½"x1"	100	70	16.5	0.4	0	.018	.0009	0	0	60	50	2000	0	15.9	0	+
	1 piece, 1"x2¼"x1"	35[1]	25	5.8	0.1	0	.006	.0003	0	0	21	18	700	0	+	0	+
salt, boneless	3⅓ oz.	100	122	29.0	0.7	0	.032	.0016	0	0	......	......	......	0	21.7	0	+
	1 oz.	30	37	8.7	0.2	0	.010	.0005	0	0	......	......	......	0	+	0	+
finnan haddie, fresh	see Haddock																
finnan haddie, smoked	1 piece, 4"x1½"x1"	100	96	23.2	0.4	0	.025	.0012	......	......	......	......	......	0	+	.....	+
	1 piece, 1"x2¼"x1"	35[1]	37	8.1	0.1	0	.009	.0004	......	......	......	......	......	0	+	.....	+
flounders	1 piece, 4"x1½"x1"	100	64	14.9	0.5	0	.016	.0008	......	......	......	......	......	0	12.1	0	+
	1 piece, 1"x2¼"x1"	35[1]	22	5.2	0.2	0	.006	.0003	......	......	......	......	......	0	+	0	+

[1] Weight cooked—30 grams.

Table 1. Nutritive Values of the Edible Portion of Average Servings of Common Foods (Continued)

Food Material	Approximate Measure	Weights	Energy Value	Protein	Fat	Carbohydrate	Calcium	Iron	Vitamin A	Ascorbic Acid	Thiamine	Riboflavin	Niacin	Fiber	Reaction: Acid	Reaction: Base	Purin Value
		grams	Cal.	grams	grams	grams	grams	grams	I. U.	m gm.	mcgm.	mcgm.	mcgm.	%			
Fish																	
haddock	1 piece, 4"x1½"x1"	100	72	17.2	0.3	0	.019	.0009	0	0	15	......	900	0	+	0	+
	1 piece, 1"x2¼"x1"	35[1]	25	5.9	0.1	0	.007	.0003	0	0	5	......	315	0	+	0	+
smoked (See Finnan Haddie)																	
halibut	1 piece, 4"x1½"x1"	100	121	18.6	5.2	0	.020	.0010	......	......	90	60	6000	0	9.3	0	+
	1 piece, 1"x2¼"x1"	35[1]	42	6.5	1.8	0	.007	.0004	......	......	32	21	2100	0	+	0	+
smoked	1 piece, 3½x2¼x¼"	100	218	20.8	15.0	0	.023	.0011	......	......	......	......	......	0	+	0	+
herring, Atlantic	1 sm.	100	136	19.0	6.7	0	.021	.0010	(145)	......	(90)	(200)	(5000)	0	12.7	0	+
	⅓ sm.	35[1]	48	6.7	2.3	0	.007	.0004	(51)	......	(32)	(70)	(1750)	0	+	0	+
herring, Pacific	1 sm.	100	90	16.6	2.6	0	.018	.0009	(145)	......	(90)	(200)	(5000)	0	+	0	+
	⅓ sm.	35[1]	32	5.8	0.9	0	.006	.0003	(51)	......	(32)	(70)	(1750)	0	+	0	+
smoked (kippered)	½	100	205	22.2	12.9	0	.024	.0012	......	......	......	......	......	0	31.6	0	+
pickled	2 sm.	100	218	20.4	15.1	0	.022	.0011	......	......	......	......	......	0	+	0	+
mackerel, Spanish	1 piece, 4"x1½"x1"	100	199	19.8	13.3	0	.022	.0011	......	......	......	......	5500	0	16.2	0	+
	1 piece, 1"x2¼"x1"	35[1]	70	6.9	4.7	0	.008	.0004	......	......	......	......	1925	0	+	0	+
mackerel, common, Atlantic, fresh	1 piece, 4"x1½"x1"	100	183	18.7	12.0	0	.020	.0010	......	......	......	......	5500	0	+	0	+
salted	1 piece, 4"x1½"x1"	100	300	18.5	25.1	0	.020	.0010	......	......	......	......	......	0	+	0	+

[1]Weight cooked—30 grams.

Table 1. Nutritive Values of the Edible Portion of Average Servings of Common Foods (Continued)

Food Material	Approximate Measure	Weights	Energy Value	Protein	Fat	Carbohydrate	Calcium	Iron	Vitamin A	Ascorbic Acid	Thiamine	Riboflavin	Niacin	Fiber	Reaction: Acid	Reaction: Base	Purin Value
		grams	Cal.	grams	grams	grams	grams	grams	I. U.	m gm.	mcgm.	mcgm.	mcgm.	%			
Fish																	
mackerel, salted	1 piece, 1"x2¼"x1"	35 [1]	105	6.5	8.8	0	.008	.0004	......	......	......	......	......	0	+	0	+
salmon, Atlantic	1 piece, 4"x1½"x1"	100	211	22.5	13.4	0	.025 [2]	.0012	......	......	200	140	6500	0	8.8	0	+
	1 piece, 1"x2¼"x1"	35 [1]	74	7.9	4.7	0	.009 [2]	.0004	......	......	70	49	2275	0	+	0	+
salmon, Pacific (Chinook), fresh	1 piece, 4"x1½"x1"	100	218	17.4	16.5	0	.019 [2]	.0010	high	......	200	140	6500	0	+	0	+
	1 piece, 1"x2¼"x1"	35 [1]	75	6.1	5.8	0	.007 [2]	.0004	......	......	70	49	2275	0	+	0	+
canned[3]	1 piece, 3" x 2½x2½"	75	127	15.5	7.2	0	.050	.0010	variable [4]	0	80	variable [5]	6000	0	10.7	0	+
Pacific, smoked	½ c.	100	170	21.6	9.3	0	.024 [2]	.0012	......	......	......	......	......	0	+	0	+
sardines, canned in oil	12 sm. or 6 lge.	100	207	25.7	11.0	1.2	.035	.0018	290	0	60	120	5200	0	11.3	0	+
	4 sm. or 2 lrge.	30	62	7.7	3.3	0.4	.011	.0005	87	0	18	36	1560	0	+	0	+
sardines, canned in tomato sauce	2 4½x1¾"x1"	100	167	20.7	8.7	1.4	......	......	......	......	......	......	......	0	+	0	+
shad	1 piece, 4"x1½"x1"	100	163	18.7	9.8	0	.020	.0010	......	......	......	......	......	0	16.1	0	+
	1 piece, 1"x2¼"x1"	35 [1]	57	6.5	3.4	0	.007	.0004	......	......	......	......	......	0	+	0	+
shad, roe	3⅓ oz.	100	118	20.9	3.8	0	.023	.0012	2000	fresh 5	1000	100	2000	0	+	0	+
	1 oz.	30	35	6.3	1.1	0	.007	.0004	600	0	300	30	600	0	+	0	+

[1]Weight cooked—30 grams. [2]Higher if bone is included. [3]Bone included. [4]Chum 23, Chinook 565, Pink 75, Red 245. [5]Chum 100, Chinook 170, Red 170.

Table 1. Nutritive Values of the Edible Portion of Average Servings of Common Foods (Continued)

Food Material	Approximate Measure	Weights	Energy Value	Protein	Fat	Carbohydrate	Calcium	Iron	Vitamin A	Ascorbic Acid	Thiamine	Riboflavin	Niacin	Fiber	Reaction: Acid	Reaction: Base	Purin Value
		grams	Cal.	grams	grams	grams	grams	grams	I. U.	m gm.	mcgm.	mcgm.	mcgm.	%			
Fish, smelts, Atlantic	6 fish	100	87	17.6	1.8	0	.019	.0010						0	+	0	+
	2 fish	35 [1]	30	6.2	0.6	0	.007	.0004						0	+	0	+
swordfish	1 piece, 4"x1½"x1"	100	115	18.8	4.4	0	.020	.0010						0	+	0	+
	1 piece, 1"x2¼"x1"	35 [1]	40	6.6	1.5	0	.007	.0004						0	+	0	+
trout, brook	1 piece, 4"x1½"x1"	100	96	19.2	2.1	0	.021	.0011						0	8.8	0	+
	1 piece, 1"x2¼"x1"	35 [1]	34	6.7	0.7	0	.007	.0004						0	+	0	+
lake	1 piece, 4"x1½"x1"	100	164	18.0	10.0	0	.019	.0010						0	+	0	+
	1 piece, 1"x2¼"x1"	35 [1]	57	6.3	3.5	0	.007	.00004						0	+	0	+
tuna fish	1 piece, 4"x1½"x1"	100	136	24.8	4.1	0	.027	.0014						0	+	0	+
	1 piece, 1"x2¼"x1"	35 [1]	48	8.9	1.4	0	.009	.0005						0	+	0	+
canned	½ c. drained solids	100	217	27.7	11.8	0	.034	.0017	70	0	40	130	10600	0	21.7	0	+
whitefish, raw	1 piece, 4"x1½"x1"	100	150	22.9	6.5	0	.025	.0013						0	19.6	0	+
	1 piece, 1"x2¼"x1"	35 [1]	53	8.0	2.3	0	.009	.0005						0	+	0	+
smoked	½ fish	100	187	28.6	8.1	0	.031	.0016						0	+	0	+
Flounder (see Fish)																	
Flour, dry arrowroot	1 tbsp	9	31	0	0	7.8			0	0							0

[1] Weight cooked—30 grams.

Table 1. Nutritive Values of the Edible Portion of Average Servings of Common Foods (Continued)

Food Material	Approximate Measure	Weights	Energy Value	Protein	Fat	Carbohydrate	Calcium	Iron	Vitamin A	Ascorbic Acid	Thiamine	Riboflavin	Niacin	Fiber	Reaction: Acid	Reaction: Base	Purin Value
		grams	Cal.	grams	grams	grams	grams	grams	I. U.	m gm.	mcgm.	mcgm.	mcgm.	%			
Flour barley	1 tbsp.	7	25	0.7	0.1	5.4	.004	.0003	......	......	......	......	......	0.7	+	.....	0
buckwheat, light	¾ c.	100	354	6.3	1.1	79.7	.011	.0012	0	0	450	160	4500	0.4	6.9	0	0
gluten	1 c.	142	528	58.8	2.7	67.0	......	......	......	......	......	......	......	0.4	.....	.....	0
	1 tbsp.	8	30	3.3	0.2	3.8	......	......	......	......	......	......	......	0.4	.....	.....	0
graham	1 c.	142	511	18.5	2.8	102.8	.054	.0054	0	0	710	170	7100	1.8	11.2	0	0
	1 tbsp.	8	29	1.0	0.2	5.8	.003	.0003	0	0	40	10	400	1.8	+	0	0
rice	1 tbsp.	15	53	1.1	0.1	11.9	.001	.0001	0	0	5	5	75	0.4	+	0	0
rye, light	1 c.	142	508	12.6	1.3	111.5	.026	.0017	0	0	213	99	1280	1.1	8.1	0	0
	1 tbsp.	8	29	0.7	0.1	6.3	.001	.0001	0	0	12	6	72	1.1	+	0	0
soybean, medium fat	¾ c.	100	283	42.5	6.5	13.6	.325	.0013	110	......	820	340	2600	2.5	.....	+	0
wheat, whole grain	1 c.	142	511	18.5	2.8	102.8	.054	.0054	0	0	710	170	7100	1.8	10.5	0	0
	1 tbsp.	8	29	1.0	0.2	5.8	.003	.0003	0	0	40	10	400	1.8	+	0	0
white, patent	1 c.	128	454	13.8	1.2	96.8	.024	.0009	0	0	96	51	1280	0.3	9.6	0	0
	1 tbsp.	7	25	0.8	0.1	5.3	.001	0	0	0	5	3	70	0.3	+	0	0
white, patent,	1 c.	128	454	13.8	1.2	96.8	.024	.0037	......	......	563	333	4480	......	.....	.....	......
enriched	1 tbsp.	7	25	0.8	0.1	5.3	.001	.0002	......	......	31	18	245	......	.....	.....	......
Frankfurters	3, 4½″ long	100	201	15.2	14.1	3.3	.009	.0023	(0)	0	190	230	2400	0	11.9	0	+
	1, 4¼″ long	30	60	4.6	4.2	1.0	.003	.0007	0	0	57	69	720	0	+	0	+
French dressing (see Salad dressings)																	
G																	
Gelatin, granulated	1 tbsp.	6	21	5.1	0	0	0	0	0	0	0	0	0	0	.....	.....	0
	1 tsp.	2	7	1.7	0	0	0	0	0	0	0	0	0	0	.....	.....	0
Glucose	9 tsp.	30	104	0	0	26	0	0	0	0	0	0	0	0	.....	.....	0
	6 tsp.	20	72	0	0	18	0	0	0	0	0	0	0	0	.....	.....	0
Goose, muscle only	3 slices, 3″x3″x⅛″	100	153	22.3	7.1	0	.009	.0024	......	......	......	......	......	0	13.0	0	+

Table 1. Nutritive Values of the Edible Portion of Average Servings of Common Foods (Continued)

Food Material	Approximate Measure	Weights	Energy Value	Protein	Fat	Carbohydrate	Calcium	Iron	Vitamin A	Ascorbic Acid	Thiamine	Riboflavin	Niacin	Fiber	Reaction: Acid	Reaction: Base	Purin Value
		grams	Cal.	grams	grams	grams	grams	grams	I. U.	m gm.	mcgm.	mcgm.	mcgm.	%			
Goose, muscle only	1 slice 3"x3"x⅛"	30	46	6.7	2.1	0	.003	.0007	...	...	...	...	...	0	+	0	+
Gooseberries	4 hp. tbsp.	90	42	0.7	0.4	9.1	.020	.0005	...	23	...	...	...	2.5	0	7.3	0
Grapefruit	½ med.	100	44	0.5	0.2	10.1	.017	.0003	0	43	40	30	200	0.3	0	6.4	0
juice, fresh	7 tbsp.	110	46	0.4	0.1	10.1	.011	.0003	0	50	40	44	220	...	0	4.0	0
juice, canned, unsweetened	7 tbsp.	110	41	0.5	0.2	9.4	.008	.0004	0	42	40	33	220	...	0	4.0	0
Grapes, American type (Concord)	1 sm. bunch or 24	100	78	1.4	1.4	14.9	.017	.0006	0	4	50	15	400	0.5	0	3.5	0
European (Malaga)	12	57	42	.5	.2	9.5	.010	.0003	0	2	29	9	228	0.5	0	3.5	0
Grape juice, Amer. type	½ c. sc.	100	76	.4	0	18.5	.011	.0003	0	2	...	...	...	...	0	3.9	0
Guava	1 fruit	100	78	1.0	0.6	17.1	...	...	200	325	45	10	1000	5.5	0	+	0
H																	
Haddock (see Fish)																	
Halibut (see Fish)																	
Ham (see Pork, ham)																	
Hazelnuts (see Filberts)																	
eart (see Beef, Lamb, Pork)																	
Herring (see Fish)																	
Hickory nuts	14 nuts	30	215	4.2	20.2	4.0	...	.0007	...	...	...	...	...	2.2	0	+	0
Hominy, dry	3 tbsp.[1]	30	107	2.6	0.2	23.7	.003	.0003	0	0	45	15	270	0.4	4.0	0	0
Honey	⅓ c.	100	319	0.3	0	79.5	.005	.0009	0	2	4	25	200	0	...	2.1	0
	1 tbsp.	30	96	0.1	0	23.9	.002	.0003	0	1	1	8	60	0	...	+	0
Horse-radish	1 tsp.	5	20	0.2	0	1.1	...	...	...	20	...	...	...	2.4	...	5.8	0
Huckleberries	⅔ c.	100	68	0.6	0.6	15.1	.026	.0009	...	30	...	...	...	1.2	0	1.6	0

[illegible] water gives 11 tbsp. or ¾ c.

FOOD MATERIAL	APPROXIMATE MEASURE	WEIGHTS	ENERGY VALUE	PROTEIN	FAT	CARBOHYDRATE	CALCIUM	IRON	VITAMIN A	ASCORBIC ACID	THIAMINE	RIBOFLAVIN	NIACIN	FIBER	REACTION		PURIN VALUE
															ACID	BASE	
		grams	Cal.	grams	grams	grams	grams	grams	I. U.	m gm.	mcgm.	mcgm.	mcgm.	%			
I																	
Ice Cream, plain	2 hp. tbsp.	100	214	3.9	13.0	20.3	......	......	......	......	......	......	......	0	0	0.5	0
J																	
Jam, commercial	5 tbsp	100	288	0.5	0.3	70.8	.012	.0003	10	6	20	20	200	0.6	0	+	0
Jelly	5 tbsp.	100	261	0.2	0	65	(.012)	(.0003)	(10)	4	(20)	(20)	(200)	0	......	......	0
K																	
Kale	½ c. cooked	100	50	3.9	0.6	7.2	.225	.0022	10000	100	150	400	(800)	1.2	0	4.0	0
Kohl-rabi	⅔ c.	100	36	2.1	0.1	6.7	.078	.0007	......	60	50	......	250	1.1	0	7.4	0
Kidney (see Beef, Lamb, Pork)																	
L																	
Lactose	3 tbsp.	30	120	0	0	30	0	0	0	0	0	0	0	0	......	......	0
Lamb, heart	1, 4" long	100	158	16.8	9.6	1.0	.010	.0062	tr	......	600	......	6000	0	+	0	+
kidney	1 whole	100	100	10.6	3.3	1.0	.016	.0005	1000	......	300	2100	6500	0	+	0	+
liver	1 piece, 4"x3"x⅝"	100	131	21.0	3.9	2.9	.008	.0121	27000	fresh 27	400	3300	18000	0	+	0	+
Lamb muscle, chop, loin	1 lge. or 2 med.	100	230	18.0	17.5	0	.010	.0027	0	......	200	250	5000	0	9.6	0	+
	1 sm. or 1" cube meat	30	69	5.4	5.3	0	.003	.0008	0	......	60	75	1500	0	+	0	+
roast, leg	4 slices, 4½"x2"x⅛"	100	230	18.0	17.5	0	.010	.0027	0	......	200	250	5000	0	+	0	+
	1 slice, 4½"x2"x⅛"	25	58	4.5	4.4	0	.003	.0007	0	......	50	63	1250	0	+	0	+
Lard	1 tbsp.	15	135	0	15	0	0	0	1	0	......	......	......	0	0	0	0
Leeks	1 c. of ½" pieces	100	45	2.5	0.4	7.9	......	......	1000	30	80	......	......	1.3	0	+	0

Table 1. Nutritive Values of the Edible Portion of Average Servings of Common Foods (Continued)

FOOD MATERIAL	APPROXIMATE MEASURE	WEIGHTS	ENERGY VALUE	PROTEIN	FAT	CARBOHYDRATE	CALCIUM	IRON	VITAMIN A	ASCORBIC ACID	THIAMINE	RIBOFLAVIN	NIACIN	FIBER	REACTION ACID	REACTION BASE	PURIN VALUE
		grams	Cal.	grams	grams	grams	grams	grams	I. U.	m gm.	mcgm.	mcgm.	mcgm.	%			
Lemon	1 large	100	44	0.9	0.6	8.7	.014	.0001	0	43	40	tr	100	0.9	0	0.4	0
	1 med.	70	31	0.6	0.4	6.1	.010	0	0	30	28	tr	70	0.6	0	+	0
Lemon juice	½ c. sc.	100	.....	0	0	(8.3)	.014	.0001	0	45	40	tr	100		0	4.0	0
	2 tbsp.	30	.....	0	0	(2.5)	.004	0	0	14	12	tr	30		0	+	0
Lentils, dried	2½ tbsp.	30[1]	105	7.4	0.3	18.0	.029	.0025	15	0	150	95	900	3.3	5.1	0	+
Lettuce, green	6 large leaves	100	18	1.2	0.2	2.9	.062	.0011	5000	12	75	150	200	0.6	0	7.4	0
bleached	¼ sm. head	100	18	1.2	0.2	2.9	.022	.0005	100	8	75	30	200	0.6	0	7.4	0
romaine	6 large leaves	100	18	1.2	0.2	2.9	.062	.0011	1000	(12)	(75)	(150)	(200)	0.6	0	6.1	0
Lime juice	½ c. sc.	100	35	0.4	0.0	8.3	.....	.....	.....	35	30	.....	100	.....	0	.....	0
Liver (see Beef, Chicken, Lamb, Pork, Veal)																	
Lobster	½ c. fresh or cooked	100	84	16.2	1.9	0.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	+
	1/6 c. cooked	35	29	5.7	0.7	0.2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	+
Loganberries	½ c. sc.	100	43	1.0	0.6	15.0	.027	.0021	.....	35	.....	.....	.....	0	0	7.2	0
M																	
Macaroni, dry	¼ c.	20	72	2.6	0.3	14.8	.004	.0002	0	.....	26	16	420	0.4	9.5	0	0
boiled	¾ c. sc.	100	96	3.7	0.4	19.4	.005	.0003	0	.....	34	21	350	0.1	1.7	0	0
Mackerel (see Fish)																	
Mango	1 sm.	100	73	0.7	0.2	11.2	.....	.....	1000	65	60	50	.....	1.0	0	+	0
Maple sirup	2 tbsp.	30	77	.....	.....	19.2	.....	.....	.....	.....	.....	.....	.....	0	.....	.....	0
Margarine	½ c. sc.	100	733	0.6	81.0	0.4	.002	.0002	[2]	0	(0)	(0)	(0)	0	.....	.....	0
	1 tbsp.	15	110	0.1	12.2	0.1	0	0	[2]	0	(0)	(0)	(0)	0	.....	.....	0
Marrow, vegetable	3⅓ oz. fresh or cooked	100	19	0.6	0.1	3.9	.015	.0004	750	20	40	50	1000	0.5	.....	.....	0

[1] Cooked with ½ c. water gives 100 grams.

[2] Value 0 unless enriched. See claims of manufacturer.

Table 1. Nutritive Values of the Edible Portion of Average Servings of Common Foods (Continued)

Food Material	Approximate Measure	Weights	Energy Value	Protein	Fat	Carbohydrate	Calcium	Iron	Vitamin A	Ascorbic Acid	Thiamine	Riboflavin	Niacin	Fiber	Reaction Acid	Reaction Base	Purin Value
		grams	Cal.	grams	grams	grams	grams	grams	I. U.	m gm.	mcgm.	mcgm.	mcgm.	%			
Mayonnaise (see Salad Dressings)																	
Milk, fresh, whole, Pasteurized........	1 c............	240	166	8.4	9.4	11.8	.283	.0002	288	3	77	384	240	.....	0	2.3	0
	1 glass........	220	152	7.7	8.6	10.8	.260	.0002	264	2.8	70	352	220	.....	0	+	0
	½ c. sc........	100	69	3.5	3.9	4.9	.118	.0001	120	1.3	32	160	100	.....	0	+	0
	1 tbsp.........	15	10	0.5	0.6	0.7	.018	0	18	0.2	5	24	15	.....	0	+	0
fresh, skim, Pasteurized.......	1 c............	240	84	8.4	2.4	12.2	(.283)	(.0002)	24	0	91	396	216	.....	0	+	0
	1 glass........	220	77	7.7	2.2	11.2	(.260)	(.0002)	22	0	84	363	198	.....	0	+	0
	½ c. sc........	100	35	3.5	0.1	5.1	(.118)	(.0001)	10	0	38	165	90	.....	0	+	0
	1 tbsp.........	15	5	0.5	0	0.8	.018	0	2	0	6	25	14	.....	0	+	0
whole, evaporated...	7 tbsp.........	100	139	7.0	7.9	9.9	.243	.0002	400	0	45	390	200	.....	0	4.6	0
	1 tbsp.........	15	21	1.1	1.2	1.5	.036	0	60	0	7	59	30	.....	0	+	0
	1 tsp..........	5	7	0.4	0.4	0.5	.012	0	20	0	2	20	10	.....	0	+	0
dried, whole........	1 c............	100	496	25.8	26.7	38.0	.949	.0006	960	0	205	1500	800	.....	0	+	0
	3 tbsp. sc......	20	99	5.2	5.3	7.6	.190	.0001	192	0	41	300	160	.....	0	+	0
	1 tbsp.........	7	35	1.8	1.9	2.7	.066	0	67	0	14	105	56	.....	0	+	0
dried, skim.........	¾ c............	100	359	35.6	1.0	52.0	1.300	.0006	100	0	300	1600	1000	.....	0	+	0
	2½ tbsp......	20	72	7.1	0.2	10.4	.260	.0001	20	0	60	320	200	.....	0	+	0
	1 tbsp. sc......	7	25	2.5	0.1	3.6	.091	0	7	0	21	112	70	.....	0	+	0
condensed..........	6⅔ tbsp......	100	327	8.1	8.4	54.8	.273	.0002	(430)	0	(50)	(390)	(200)	.....	0	4.5	0
	1 tbsp.........	15	49	1.2	1.3	8.2	.041	0	(65)	0	(8)	(59)	(30)	.....	0	+	0
	1 tsp..........	5	16	0.4	0.4	2.7	.014	0	(22)	0	(3)	(20)	(10)	.....	0	+	0
malted, powder.....	½ c. sc........	100	418	14.6	8.5	70.7	.356	.0002	.....	.....	.....	.....	.....	0.3	0	1.0	0
	3½ tbsp......	30	125	4.4	2.6	21	.107	.0001	.....	.....	.....	.....	.....	0.3	0	+	0

Table 1. Nutritive Values of the Edible Portion of Average Servings of Common Foods (Continued)

FOOD MATERIAL	APPROXIMATE MEASURE	WEIGHTS	ENERGY VALUE	PRO-TEIN	FAT	CARBO-HYDRATE	CAL-CIUM	IRON	VITA-MIN A	AS-COR-BIC ACID	THIA-MINE	RIBO-FLAVIN	NIA-CIN	FIB-ER	REACTION ACID	REACTION BASE	PURIN VALUE
		grams	Cal.	grams	grams	grams	grams	grams	I. U.	m gm.	mcgm.	mcgm.	mcgm.	%			
Milk																	
malted, powder	1 tbsp.	9	38	1.3	0.8	6.4	.032	0	......	......	......	......	......	0.3	0	+	0
Molasses, dark	4 tbsp.	100	220	(0)	(0)	(55)	.273	.0067	0	0	80	160	......	0	0	56.0	0
pure cane	½ c.	170	408	(0)	(0)	(102)	.068	.0068	0	0	85	102	......	......	......	......	0
	1 tbsp.	23	56	(0)	(0)	(14)	.010	.0015	0	0	20	23	......	......	......	......	0
Mushrooms	⅔ c. or 4 large	100	......	(0)	0.3	(0)	.014	.0007	0	1	60	5	......	0.9	0	4.0	......
Muskmelon, fresh	½ small	100	28	0.6	0.2	5.9	.017	.0004	1000	30	50	50	1000	0.5	0	7.0	0
Mustard, dry	1 tsp.	3	0	0	0	0	.015	......	......	......	......	......	......	......	30.8	......	......
Mustard greens	½ c. cooked	100	28	2.3	0.3	4.0	......	......	10000	120	100	350	......	0.8	0	+	0
Mutton (see Lamb)																	
N																	
Noodles (see Macaroni)																	
O																	
Oatmeal, dry	5 tbsp. or ⅓ c. full	30[1]	119	4.3	2.2	20.5	.016	.0016	0	0	180	38	300	1.2	12.0	0	+
	3½ tbsp. or ⅓ c. sc.	20[2]	79	2.8	1.5	13.6	.011	.0010	0	0	120	25	200	1.2	+	0	+
Okra	½ c.	100	39	1.8	0.2	7.4	.082	.0007	2000	30	120	100	700	1.0	0	2.6	0
Olives, gren, pickled	10 large	100	144	1.5	13.5	4.0	.101	.0020	200	0	......	......	......	1.2	3.8	0	0
	2 large	20	29	0.3	2.7	0.8	.020	.0004	40	0	......	......	......	1.2	+	0	0
ripe, pickled	10 large	100	189	1.6	19.0	3.0	......	......	125	0	6	0	......	1.9	......	......	0
ripe	2 large	20	38	0.3	3.8	0.6	......	......	25	0	1	0	......	1.9	......	......	0
Olive oil or other salad oils	½ c.	100	900	0	100	0	......	......	0	0	......	......	......	0	0	+	0
	1 tbsp.	15	135	0	15	0	......	......	0	0	......	......	......	0	0	+	0

[1]Cooked with a full ⅔ c. water gives 10 tbsp. or ⅔ c. sc.

[2]Cooked with a scant ⅔ cup water gives 7 tbsp. or ½ c. sc.

Table 1. Nutritive Values of the Edible Portion of Average Servings of Common Foods (Continued)

Food Material	Approximate Measure	Weights	Energy Value	Protein	Fat	Carbohydrates	Calcium	Iron	Vitamin A	Ascorbic Acid	Thiamine	Riboflavin	Niacin	Fiber	Reaction		Purin Value
															Acid	Base	
		grams	Cal.	grams	grams	grams	grams	grams	I. U.	m gm.	mcgm.	mcgm.	mcgm.	%			
Onions, mature	3 med.	100	49	1.4	0.2	10.3	.032	.0005	0	15	30	25	100	0.8	0	+	+
young, green, scallions	20 sm. 5" long	100	48	1.0	0.2	10.6	......	......	5000	30	......	......	......	1.8	0	1.0	......
Oranges	1 med.	100	50	0.9	0.2	11.2	.033	.0004	(190)	43	80	30	200	0.6	0	5.0	0
Orange juice	½ c. sc.	100	55	0.6	0	13.1	.033	.0004	150	45	70	35	250	......	0	5.0	0
Orange marmalade	⅓ c.	100	288	0.5	0.3	70.8	.012	.0003	10	6	20	20	200	......	......	......	0
Oyster plant	⅔ c.	100	85	3.5	1.0	15.5	......	......	......	......	......	......	......	1.8	0	+	0
Oysters, flesh only	1 c.	255	207	25.0	5.1	14.0	.173	.0180	510	......	510	560	2550	0	+	0	+
	7 med.	100	81	9.8	2.0	5.9	.068	.0071	200	......	200	220	1000	0	15.1	0	+
	2 med.	30	24	2.9	0.6	1.8	.020	.0021	60	......	60	66	300	0	+	0	+
P																	
Papaya, ripe	¾, 5" in diam.	100	43	0.6	0.1	10.0	......	......	2500	85	30	33	90	0.9	0	+	......
Parsley	1 bunch, large	100	60	3.7	1.0	9.0	.193	.0043	18000	100	......	300	......	1.8	......	......	0
	1 sprig	5	3	0.2	0.1	0.5	.010	.0002	900	5	......	15	......	1.8	......	......	0
Parsnips	¾ c. sliced or 1 large	100	83	1.5	0.5	18.2	.057	.0007	0	22	80	90	200	2.2	0	12.0	0
Peaches, yellow, fresh	1 large	100	51	0.5	0.1	12.0	.008	.0006	2000	7	40	60	900	0.6	0	5.0	0
white	1 large	100	51	0.5	0.1	12.0	.008	.0006	100	7	40	60	900	0.6	0	5.0	0
canned, juice packed	2 large halves	100	41	0.4	0.2	9.4	(.006)	(.0004)	......	......	......	......	......	0.2	......	......	......
canned in syrup	2 large halves	100	75	0.4	0.1	18.2	(.005)	.0004	450	4	10	20	700	0.2	0	5.1	0
dried, yellow	1 c.	85	295	3.0	0.6	69.4	.044	.0069	3000	0	10	100	3000	3.5	0	8.0	0
Peanut butter	7 tbsp.	100	619	26.1	47.8	21.0	.074	.0019	0	0	200	160	16200	2.0	4.4	0	+
	2 tbsp.	30	186	7.8	14.3	6.3	.022	.0006	0	0	60	48	4860	2.0	+	0	+
Peanuts, Virginia type, roasted	15 nuts	30	180	8.1	13.3	7.1	.022	.0006	0	0	60	48	4860	2.4	3.9	0	+
Spanish type, roasted	27 nuts, med.	30	184	8.3	14.6	5.0	(.022)	(.0006)	0	0	60	(48)	(4860)	2.5	3.9	0	+

Table 1. Nutritive Values of the Edible Portion of Average Servings of Common Foods (Continued)

FOOD MATERIAL	APPROXIMATE MEASURE	WEIGHTS	ENERGY VALUE	PROTEIN	FAT	CARBOHYDRATE	CALCIUM	IRON	VITAMIN A	ASCORBIC ACID	THIAMINE	RIBOFLAVIN	NIACIN	FIBER	REACTION ACID	REACTION BASE	PURIN VALUE
		grams	Cal.	grams	grams	grams	grams	grams	I. U.	m gm.	mcgm.	mcgm.	mcgm.	%			
Pears	1 sm.	100	70	0.7	0.4	15.8	.013	.0003	20	5	30	40	100	1.4	0	4.0	0
cooked or canned, juice pack	2 halves	100	50	0.2	0.1	12.1	.013	.0003	15	3	10	15	100	0.6	0	1.7	0
Peas, green, fresh	½ c. sc.	100	101	6.7	0.4	17.7	.022	.0019	1000	25	400	200	2000	2.2	0	1.3	+
cooked or canned	½ c.	100	69	3.4	0.4	12.9	.025	.0018	800	11	125	100	1500	1.3	0	1.5	+
dried	3 tbsp.	30	105	7.1	0.4	18.1	.022	.0018	225	0	158	90	840	5.4	0	7.1	+
Pecans	10 nuts, large	30	224	2.8	21.9	3.9	.022	.0007	90	......	150	40	240	2.2	13.7	0	0
Peppers, sweet, green	1 med.	100	29	1.2	0.2	5.7	.011	.0004	3000	150	50	50	400	1.6	0	1.8	0
sweet, red	1 med.	100	44	1.3	0.7	8.1	(.011)	(.0004)	2000	125	50	......	......	1.6	0	1.8	0
Persimmons	1 sm.	100	141	0.8	0.4	33.5	.022	.0003	......	ripe 100	......	......	......	1.5	0	6.0	0
Pineapples, fresh	1 slice, ¾" thick	100	58	0.4	0.2	13.7	.016	.0003	150	15	60	35	(200)	0.4	0	6.8	0
cooked or canned, juice pack	2 sm. slices	100	60	0.4	0.1	14.5	(.016)	(.0003)	100	10	50	......	......	0.4	0	+	0
Pineapple juice, fresh	½ c. sc.	100	(52)	......	......	(12.8)	......	......	125	20	65	35	......	......	......	......	......
canned	½ c. sc.	100	54	0.3	0.1	13.1	.015	.0005	100	10	50	20	200	......	0	+	0
Pistachios	10 nuts, large	5	32	1.0	2.7	0.9	......	......	......	......	......	......	......	2.2	......	......	......
Plums	3 av.	100	56	0.7	0.2	12.9	.017	.0005	350	7	100	45	500	0.5	0	5.5	0
Pork muscle, loin, lean	1 large chop	100	234	17.9	18.0	0	.010	.0022	0	......	1200	225	5000	0	10.0	0	+
	1 med. chop	75	176	13.4	13.5	0	.008	.0017	0	......	900	168	3750	0	+	0	+
loin, medium fat	1 large chop	100	291	16.4	25.0	0	.008	.0018	0	......	1000	190	3500	0	+	0	+
	1 med. chop	75	218	12.3	18.8	0	.006	.0014	0	......	750	143	2625	0	+	0	+
muscle, ham, fresh, lean	4 slices, 4½"x4"x⅛"	100	267	17.2	22.0	0	.022	.0022	0	......	1200	225	6000	0	12.5	0	+
ham, fresh, lean	2 slices, 4½"x4"x⅛"	50	134	8.6	11.0	0	.011	.0011	0	......	600	113	3000	0	+	0	+

Nutritive Values of the Edible Portion of Average Servings of Common Foods (Continued)

Food Material	Approximate Measure	Weights	Energy Value	Protein	Fat	Carbohydrate	Calcium	Iron	Vitamin A	Ascorbic Acid	Thiamine	Riboflavin	Niacin	Fiber	Reaction: Acid	Reaction: Base	Purin Value
		grams	Cal.	grams	grams	grams	grams	grams	I. U.	m gm.	mcgm.	mcgm.	mcgm.	%			
Pork, ham, fresh, med. fat	4 slices, 4½"x4"x⅛"	100	340	15.2	31.0	0	.009	.0023	0	......	960	190	4100	0	+	0	+
	2 slices, 4½"x4"x⅛"	50	170	7.6	15.5	0	.005	.0012	0	......	480	95	2050	0	+	0	+
ham, smoked, lean...	4 slices, 4½"x4"x⅛"	100	304	19.5	25.0	0.3	.025	.0025	0	......	972	225	5562	0	8.3	0	+
	1 slice, 4½x4½x⅛"	30	91	5.9	7.5	0.1	.008	.0008	0	......	292	68	1670	0	+	0	+
ham, smoked, med. fat..............	4 slices, 4½"x4"x⅛"	100	384	16.9	35.0	0.3	.010	.0025	0	......	780	190	3800	0	+	0	+
	1 slice, 4½x4½x⅛"	30	115	5.1	10.5	0.1	.003	.0008	0	......	234	57	1140	0	+	0	+
ham, deviled........	1½ tsp. sc.....	10	46	1.9	4.3	0	.001	.0002	0	......	80	20	400	0	+	0	+
heart..............	½ med........	100	112	16.9	4.8	0.4	.010	.0062	(0)	......	600	900	6000	0	+	0	+
kidney............	1 piece, 4"x2"x⅞"...	100	110	16.3	4.6	0.8	.016	.0065	......	......	......	2100	6500	0	+	0	+
liver..............	1 piece, 4"x3"x⅝"...	100	129	19.7	4.8	1.7	.008	.0121	27000	fresh 27	425	2700	18000	0	+	0	+
salt, fat...........	1" cube.......	15	117	0.6	12.8	0	0	.0001	0	0	(180)	(40)	(900)	0	+	0	+
Potato chips..........	6 hp. tbsp.....	100	557	6.7	37.1	49.1	......	......	......	......	......	......	......	......	......	......	......
Potatoes, white.......	1, med........	100	85	2.0	0.1	19.1	.011	.0007	30	12	100	50	1100	0.4	0	9.0	0
Prunes, fresh.........	3 large........	100	93	0.9	0.2	21.8	......	......	1500	......	50	50	500	0.5	+	.....	0
dried.............	12, 50/60s.....	100	299	2.3	0.6	71.0	.054	.0039	2500	1	125	125	1800	1.6	10.6	0	0
dried, cooked with sugar............	6 med. without stones......	100	211	1.2	0.3	51.0	......	......	......	......	......	......	......	......	......	......	......

Table 1. Nutritive Values of the Edible Portion of Average Servings of Common Foods (Continued)

FOOD MATERIAL	APPROXIMATE MEASURE	WEIGHTS	ENERGY VALUE	PROTEIN	FAT	CARBOHYDRATE	CALCIUM	IRON	VITAMIN A	ASCORBIC ACID	THIAMINE	RIBOFLAVIN	NIACIN	FIBER	REACTION		PURIN VALUE
															ACID	BASE	
		grams	Cal.	grams	grams	grams	grams	grams	I. U.	m gm.	mcgm.	mcgm.	mcgm.	%			
Prunes																	
dried, cooked without sugar	6 med. without stones	100	150	1.2	0.3	35.5	...	...	...	...	...	...	...	...	...	...	...
Pumpkin, fresh	½ c. cubed	100	36	1.2	0.2	7.3	.021	.0008	2000	5	45	50	600	1.3	0	1.5	0
canned	½ c.	100	38	1.0	0.3	7.9	(.020)	(.0007)	2000	0	20	50	500	1.2	0	8.5	0
Q																	
Quail, E. P.	½ whole	100	161	25.0	6.8	0	.015	.0038	...	...	...	...	...	0	+	0	+
Quince	1 med.	100	58	0.3	0.1	13.9	...	.0010	...	8	...	...	...	...	...	...	...
R																	
Radishes	5 med. 1″ in diam.	30	7	0.4	0	1.3	.011	.0003	8	6	18	9	30	0.7	0	5.0	0
Raisins, seeded	100	100	298	2.3	0.5	71.2	.055	.0030	0	0	100	30	450	...	0	23.7	0
	¼ c.	30	89	0.7	0.2	21.2	.017	.0009	0	0	30	9	135	...	0	+	0
Raspberries, red	½ c.	100	67	1.1	0.6	14.4	.040	.0009	150	20	30	...	...	2.8	0	6.1	0
Rhubarb	1 c. 1″ pieces	100	18	0.5	0.1	3.8	.051	.0005	100	15	15	...	100	0.7	0	+	0
Rice, brown, dry	2 tbsp.	30[1]	107	2.3	0.5	23.3	.012	.0017	0	0	75	15	1200	0.6	+	0	0
white, dry	2 tbsp.	30[1]	105	2.3	0.1	23.8	.003	.0002	0	0	9	9	420	0.2	9.0	0	0
converted	¾ c.	30	105	2.3	0.1	23.8	.003	.0002	0	0	75	12	1140	0.2	+	0	0
puffed	¾ c.	15	54	1.1	0.1	12.4	.001	.0001	0	0	8	5	210	0.3	7.4	0	0
Romaine (see Lettuce)																	
Rutabaga, yellow	¾ c.	100	41	1.1	0.1	8.9	.055	.0004	100	45	70	60	50c	1.3	0	8.0	0
S																	
Salad Dressings																	
boiled	1 tbsp.	22	37	1.0	2.2	3.3	.018	.0002	150	...	12	36	...	...	...	...	...

Table I. Nutritive Values of the Edible Portion of Average Servings of Common Foods (Continued)

Food Material	Approximate Measure	Weight	Energy Value	Protein	Fat	Carbohydrate	Calcium	Iron	Vitamin A	Ascorbic Acid	Thiamine	Riboflavin	Niacin	Fiber	Reaction: Acid	Reaction: Base	Purin Value
		grams	Cal.	grams	grams	grams	grams	grams	I.U.	m gm.	mcgm.	mcgm.	mcgm.	%			
Salad Dressings																	
French, with lemon juice	1 tbsp.	11	47	0.1	4.3	1.9	.....				3	.....	.....	.....	.....	.....	.....
French, with vinegar	1 tbsp.	11	47	0.1	4.3	1.9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
mayonnaise	1 tbsp.	14	101	0.2	10.9	0.4	.002	.0001	35	.....	6	8	.....	0	1.1	0	0
(mineral oil)	1 tbsp.	14	6	0.2	0.4	0.4	.002	.0001	35	.....	4	8	.....	0	.....	0	0
Russian	1 tbsp.	12	51	0.1	4.7	2.1	.002	.0001	65	1	6	9	.....	.....	.....	.....	.....
Salmon (see Fish)																	
Sardines (see Fish)																	
Sauerkraut	½ c. or 4 r. tbsp.	100	27	1.3	0.2	4.9	(.046)	(.0005)	25	8	25	40	170	1.4	0	5.7	0
Scallops	½ c.	100	74	14.8	0.1	3.4	.090	.0023	.....	.....	.....	.....	.....	0	+	0	+
Shad (see Fish)																	
Shrimp, canned, A. P.	¾ c.	100	82	17.8	0.8	0.8	.075	.0020	60	0	60	100	2000	0	.....	.....	+
	¼ c. sc. or 4 or 5 av.	25	20	4.5	0.2	.019	.019	.0005	15	0	15	25	500	0	.....	.....	+
Smelts (see Fish)																	
Soup, canned, A. P.																	
bean	½ c.	120	86	5.1	3.2	9.0	.....	.....	.....	.....	.....	.....	.....	0.4	.....	.....	.....
consomme	½ c.	120	5	1.2	0	0	.....	.....	.....	.....	.....	.....	.....	0	.....	.....	.....
clam chowder	½ c.	120	62	2.5	2.3	7.8	.....	.....	.....	.....	.....	.....	.....	0.1	+	0	+
tomato, puree	½ c.	120	48	2.2	0.6	8.6	(.013)	(.0013)	2200	34	108	84	2100	4.8	.....	.....	0
vegetable	½ c.	120	52	2.4	0.1	10.3	.022	.0006	240	3	52	38	.....	0.5	.....	.....	.....
Soybeans, (see Beans)																	
Soybean flour (see Flour)																	
Soybean milk	½ c.	120	42	4.1	1.8	2.4	.....	.....	.....	.....	.....	.....	.....	0	.....	.....	.....
Spaghetti, (see Macaroni)																	

[1]Not nutritionally available.

Table 1. Nutritive Values of the Edible Portion of Average Servings of Common Foods (Continued)

FOOD MATERIAL	APPROXIMATE MEASURE	WEIGHTS	ENERGY VALUE	PROTEIN	FAT	CARBOHYDRATE	CALCIUM	IRON	VITAMIN A	ASCORBIC ACID	THIAMINE	RIBOFLAVIN	NIACIN	FIBER	REACTION		PURIN VALUE
															ACID	BASE	
		grams	Cal.	grams	grams	grams	grams	grams	I. U.	m gm.	mcgm.	mcgm.	mcgm.	%			
Spinach fresh	1½ c. or 2 heads	100	25	2.3	0.3	3.2	.083[1]	.0034	18000	50	100	250	700	0.6	0	27.1	0
canned	½ c.	100	25	2.3	0.4	3.0	.089[1]	.0016	13000	21	20	80	300	0.7	0	14.7	0
Squab, cooked with skin, E. P.	1 whole	50	137	9.3	11.1	0	.006	.0015	......	......	......	......	......	0	14.9	0	+
Squash, summer	½ c. or 4 r. tbsp. cooked	100	19	0.6	0.1	3.9	.015	.0004	750	20	45	50	1000	0.5	0	4.3	0
winter	½ c. or 4 r. tbsp cooked, mashed	100	44	1.5	0.3	8.8	.019	.0006	4000	5	45	80	600	1.4	0	8.3	0
Strawberries, fresh	½ c. or 12 med	100	41	0.8	0.6	8.1	.022	.0009	50	55	25	35	190	1.2	0	3.5	0
canned, juice pack	⅜ c.	100	42	0.8	0.8	8.0	......	......	......	......	......	......	......	0.8	0	+	0
canned in syrup	⅜ c.	100	116	0.5	0.2	28.0	......	......	......	......	......	......	......	0.7	0	+	0
Sugar, brown	1 tbsp.	15	58	......	......	14.4	.011	.0004	0	0	0	0	0	0	......	......	0
	1 tsp.	5	19	......	......	4.8	.004	.0001	0	0	0	0	0	0	......	......	0
granulated	1 c.	210	840	0	0	210	0	0	0	0	0	0	0	0	......	......	0
	1 tbsp. or 3 tsp.	15	60	0	0	14.9	0	0	0	0	0	0	0	0	......	......	0
	1 tsp.	5	20	0	0	5.0	0	0	0	0	0	0	0	0	......	......	0
loaf	1 cube	8	32	0	0	8.0	0	0	0	0	0	0	0	0	......	......	0
powdered	1 c.	184	732	0	0	184.1	0	0	0	0	0	0	0	0	......	......	0
	1 tbsp.	12	48	0	0	11.9	0	0	0	0	0	0	0	0	......	......	0
maple	1 cake, 1¾"x1"x1¾"	100	360	......	......	90.0	......	......	......	......	......	......	......	......	......	......	......
Sweetbreads, beef, med	¾ c. cooked	100	344	11.8	33.0	0	.014	.0016	......	......	......	......	......	......	+	......	+
Sweet potatoes	⅓ c. or 1 sm.	100	125	1.8	0.7	27.9	.030	.0008	5000	15	100	65	800	1.0	0	6.0	+
Swiss chard	3⅓ oz. or ¾ c cooked	100	25	1.4	0.2	4.4	.104[1]	.0040	10000	35	60	125	200	0.9	0	15.8	0
Swordfish (see Fish)																	

Food Material	Approximate Measure	Weights	Energy Value	Protein	Fat	Carbohydrate	Calcium	Iron	Vitamin A	Ascorbic Acid	Thiamine	Riboflavin	Niacin	Fiber	Reaction: Acid	Reaction: Base	Purin Value
		grams	Cal.	grams	grams	grams	grams	grams	I. U.	m gm.	mcgm.	mcgm.	mcgm.	%			
Syrups (see Corn Syrup, Molasses, etc.)																	
T																	
Tangerine	1 small	100	50	0.8	0.3	10.9	(.033)	(.0004)	(420)	35	70	20	200	1.0	0	+	0
Tapioca, granulated, dry, or pearled, dry	1 tbsp.	15	53	0.1	0	13.0	.003	.0002	......	......	......	......	......	0.1	0	0	0
Tomato, green, mature	1 med.	100	20	1.2	0.2	3.3	(.011)	(.0006)	800	22	70	45	......	0.4	0	+	0
ripe, fresh	1 med.	100	23	1.0	0.3	4.0	.011	.0006	1000	22	75	45	600	0.6	0	5.6	0
cooked or canned	½ c.	100	21	1.0	0.2	3.9	(.011)	(.0006)	900	15	65	32	600	0.4	0	+	0
Tomato juice, fresh	½ c.	100	23	1.0	0.2	4.3	.007	(.0004)	1000	22	75	45	450	0.2	0	6.6	0
canned	½ c.	100	23	1.0	0.2	4.3	(.007)	(.0004)	1000	18	50	30	600	0.2	0	5.0	0
Tripe, canned	3⅓ oz.	100	94	19.1	2.0	0	......	......	......	......	......	......	......	0	......	......	+
pickled	3⅓ oz.	100	59	11.8	1.3	0	......	......	......	......	......	......	......	0	......	......	+
Trout (see Fish)																	
Tuna fish (see Fish)																	
Turkey, medium fat	2 slices, 4"x2½"x¼"	100	262	20.1	20.2	0	.023	.0038	trace	0	120	190	7900	0	+	.....	+
Turnip, white	½ c. cubed	100	35	1.1	0.2	7.1	.040	.0005	0	30	50	50	600	1.1	0	5.2	0
yellow	½ c. cubed	100	35	1.1	0.2	7.1	.040	.0005	20	30	50	60	600	1.1	0	5.2	0
tops or greens	½ c. cooked	100	37	2.9	0.4	5.4	.254	.0024	18000	100	100	450	700	1.2	0	+	0
V																	
Veal, liver	4"x"3"x½"	100	136	19.0	4.9	4.0	.008	.0121	27000	fresh 32	400	3300	18000	.....	+	0	+
Veal muscle, lean, leg, roast	4 slices, 4½x2½x⅛"	100	186	19.1	12.2	0	.011	.0029	0	......	170	250	6300	0	9.8	0	+

Table 1. Nutritive Values of the Edible Portion of Average Servings of Common Foods (Continued)

Food Material	Approximate Measure	Weights	Energy Value	Protein	Fat	Carbohydrate	Calcium	Iron	Vitamin A	Ascorbic Acid	Thiamine	Riboflavin	Niacin	Fiber	Reaction: Acid	Reaction: Base	Purin Value
		grams	Cal.	grams	grams	grams	grams	grams	I. U.	m gm.	mcgm.	mcgm.	mcgm.	%			
Veal muscle																	
lean, leg, roast	1 slice, 2"x2¾"x⅛"	30	56	5.7	3.7	0	.003	.0009	0	......	51	75	1890	0	+	0	+
loin, medium fat	1 chop, ⅜" thick	100	176	19.2	11.0	0	.011	.0029	0	......	180	250	6300	0	+	0	+
Vinegar, cider	1 tbsp.	15	......	0	......	0.1	......	......	......	......	......	......	......	......	......	......	......
W																	
Walnuts, black	1 c.	100	672	18.3	58.2	18.7	(.083)	(.0021)	70	0	330	......	......	1.9	7.8	0	0
English	10 nuts, large	42	295	6.3	27.0	6.6	.035	.0009	21	0	189	42	504	2.1	+	0	0
	6 nuts or 12 halves	30	211	4.5	19.3	4.7	.025	.0006	15	0	135	30	360	2.1	+	0	0
Watercress	2½ c.	100	23	1.7	0.3	3.3	.168	.0026	4000	50	100	270	.....	0.5	0	7.1	0
	10 pieces	25	6	0.4	0.1	0.8	.042	.0006	1000	12	25	68	......	0.5	0	+	0
Watermelon, E. P.	1 piece, 2½"x2"x1½"	100	31	0.5	0.2	6.9	.007	.0002	50	7	30	40	200	0.6	0	4.0	0
Wheat, whole	3 tbsp.	30	108	3.9	0.6	21.7	.011	.0011	6	0	158	45	1800	1.8	12.0	0	0
cracked, dry	3 tbsp.	30	108	3.9	0.6	21.7	.011	.0011	6	0	158	45	1800	1.8	12.0	0	0
	2 tbsp.	20	72	2.6	0.4	14.5	.008	.0008	4	0	105	30	1200	1.8	+	0	0
puffed	5 hp. tbsp.	15	56	1.6	0.2	12.0	.005	.0006	0	0	23	18	630	1.8	12.0	0	0
shredded	1 biscuit	30	111	3.1	0.4	23.6	.011	.0011	0	0	56	53	1400	2.1	12.2	0	0
germ	12 tbsp.	100	389	25.2	10.0	49.5	......	......	0	0	3000	500	5000	2.5	+	0	0
Wheatena, dry	3 tbsp.[1]	30	110	3.5	0.6	22.7	.011	.0011	0	0	135	39	1280	1.8	+	0	0
Whitefish (see Fish)																	
Y																	
Yeast, compressed	1 cake	12	13	1.6	0.1	1.6	.003	.0006	0	0	54	248	3380	0	......	......	......

[1] Cooked with 1½ cups water gives ¾c.

Table 2. Percentages of Certain of the Mineral Elements in the Edible Portion of Foods‡

	Calcium	Magnesium	Potassium	Sodium	Phosphorus	Chlorine	Sulfur	Iron
Almonds	.254	.252	.759	.026	.475	.020	.150	.0044
Apples	.007	.006	.116	.010	.011	.004	.005	.0003
Apricots, dried	(.071)	*	*	*	(.113)	*	*	.0076
Apricots, fresh	.015	.009	.279	.030	.024	.002	.006	.0005
Artichokes, French	.039	.027	?	.025	.087	.057	.020	.0010
Asparagus	.021	.012	.187	.016	.052	.036	.046	.0012
Avocado	.019	.041	.653	.067	.046	.016	.037	.0014
Bacon, 10-15% protein	.012	.013	.239	.820	.109	1.251	.152	.0015
Banana	.008	.031	.373	.042	.028	.125	.012	.0006
Barley, entire	.075	.171	.485	.077	.373	?	.143	.0051
pearled	.016	.037	.110	.056	.189	?	.116	(.002)
Beans, dried	.148	.159	1.201	.103	.463	.035	.237	.0103
Lima, dried	.072	.181	1.727	.167	.380	.031	.178	.0090
Lima, fresh	.031	*	*	*	.112	*	*	.0023
snap or string	.065	.026	.251	.023	.044	.033	.030	.0011
Beef, lean	.013	.024	.338	.084	.204	.076	.230	.0030
Beets	.026	.023	.336	.079	.039	.061	.017	.0009
Beet greens	.134	.113	*	*	.039	*	*	.0032
Blackberries, seeds included	.032	.024	.181	.004	.032	.015	.017	.0009
seeds removed	.017	*	*	*	.019	.007	.008	(.0009)
Blueberries	.026	.010	.065	.016	.020	.008	.011	.0009
Bluefish	.023	.031	.315	.068	.235	.076	.241	.0010
Brazil nuts	.124	.225	.601	.026	.602	.081	.198	.0028
Bread, white	(.05)[1]	.030	.109	.446	(.10)[2]	.621	.054	.0009
whole wheat	(.06)[1]	(.15)	(.45)	[1]	(.37)	[1]	(.15)	.0030
Broccoli, E. P.	.146	.029	.395	.052	.072	.097	.145	.0014
flowerbuds	.101	.031	.408	.024	.107	*	*	*
leaves	.314	.041	.374	.064	.066	*	*	.0024
twigs	.073	.021	.361	.031	.038	*	*	*
Brussels sprouts	.025	*	*	*	.105	*	.184	.0011
Butter	.016	.001	.014	(.22)[3]	.016	(.33)[3]	.009	.0002
Cabbage, headed	.045	.012	.294	.032	.028	.039	.067	.0004
loose leaf, outer leaves, or greens	.429	.034	.402	.065	.072	.108	(.07)	.0018
general average	*	*	*	*	*	*	*	.0007
Cantaloupe	.017	.017	.249	.043	.016	.040	.015	.0004
Carrots	.042	.017	.311	.076	.040	.042	.021	.0007
Cashew nuts	.048	.267	*	*	.480	*	*	*
Cauliflower	.025	.020	.313	.041	.065	.031	.085	.0009
Celery	.072	.027	.291	.130	.046	.137	.022	.0007
Chard	.104[4]	.053	.318	.086	.050	.039	.124	.0031
Cheese, hard	.873	.042	.131	.88[3]	.610	1.35[3]	.218	(.001)
cottage	.082	*	*	*	.263	*	*	(.001)

*Doubtless present but quantitative data have not been found.
?Reports too discordant to average.

N. B. Data enclosed in parentheses ( ) are based on evidence either less consistent or less direct than in the majority of cases.

[1]Uncertain because of varying methods of breadmaking.
[2]Varies for the same reason, but in less degree.
[3]Varies with the amount of added salt.
[4]Calcium of chard is of very doubtful availability.
‡H. C. Sherman, *Chemistry of Food and Nutrition*, 6th ed., New York: The MacMillan Co., 1943.

Table 2. Percentages of Mineral Elements in Food (Continued)

	Calcium	Magnesium	Potassium	Sodium	Phosphorus	Chlorine	Sulfur	Iron
Cherries	.017	.014	.246	.003	.022	.003	.008	.0005
Chestnuts	.034	.042	.529	.038	.090	.011	.048	.0008
Chicken (fowl)	.016	.027	.372	.091	.218	.079	.252	.0019
Chocolate	.095	?	.442	.056	.343	.071	.095	.0025
Clams	.102	.089	.172	.603	.105	1.065	.219	*
Cocoa	.112	.420	.900	.059	.709	.051	.203	.0027
Coconut, dried	.043	.077	.693	.053	.191	.225	.076	.0036
fresh	.021	.039	.363	.039	.098	.122	.032	.0020
milk	.024	?	?	.058	.029	.190	.032	.0001
Codfish	.014	.022	.339	.096	.188	.150	.203	.0015
Collards	.202	*	*	*	.074	*	*	.0016
Conch	.089	.246	*	*	.112	*	.315	.0012
Corn (maize)	.029	.121	.339	.036	.281	.045	.151	.0036
meal	.016	.084	.213	.039	.152	.146	.111	.0009
sweet	.009	.038	.113	.040	.120	.014	.046	.0005
Cranberries	.014	.007	.080	.006	.011	.005	.007	.0006
Cream	(.09)	(.01)	(.13)	(.03)	(.07)	(.08)	(.03)	.0002
Cucumbers, seeds included	.010	.009	.140	.010	.021	.030	.012	.0003
seeds removed	.006	*	*	*	.018	*	*	.0003
Currants, dried	.075	.030	.458	.018	.138	.029	?	.0027
fresh	.035	.015	.261	.007	.036	.013	.029	.0009
Currant juice	.016	.010	.185	(.006)	.013	.004	.005	*
Dandelion	.113	.036	.461	.168	.041	.099	.17	.0030
Dates	.072	.065	.675	.097	.060	.283	.065	.0021
Eggplant	.009	.015	.229	.015	.020	.047	.021	.0005
Eggs	.058	.013	.138	.140	.224	.120	.197	.0031
Egg white	.011	.011	.154	.170	.015	.161	.208	.0001
Egg yolk	.157	.016	.118	.056	.538	.124	.194	.0087
Endive and Escarole	.074	.013	.381	.060	.038	.071	.032	.0017
Farina	.021	.025	.120	.065	.125	.076	.155	.0008
Figs, dried	.223	.082	.990	.066	.104	.105	.069	.0031
fresh	.050	.021	.297	.007	.035	.016	.012	.0007
Fish[5]	.....	.....	.....	.....	.....	.....	.....	.....
Flounder	.031	.025	.311	.107	.197	.151	.217	.0010
Flour, buckwheat	.010	.048	.130	.027	.176	.012	.071	.0012
Graham or entire wheat	.035	.122	.324	.160[6]	.300	.177[6]	.124	.0040
white	.015	.021	.130	.045	.101	.071	.109	.0013
Gooseberries	.022	.009	.149	.010	.028	.009	.015	.0005
Grapefruit	.017	.010	.198	.004	.018	.003	.008	.0003
juice	.010	.008	.139	.005	.017	.002	.005	.0002
Grapes	.017	.007	.254	.011	.021	.002	.009	.0006
Haddock	.040	.026	.314	(.66)[3]	.200	(1.07)[3]	.238	.0007
Halibut	.011	.024	.340	.111	.209	.088	.212	.0007
Ham, med.-lean	.022	.020	.383	[3]	.151	[3]	.225	.0022
Hazelnuts	.287	.140	.618	.019	.354	.067	.198	.0041
Heart	.010	.035	.370	.153	.236	.125	.296	.0062

[5]Average fish is estimated to contain per 100 grams of protein as follows: 0.109 gram Ca; 0.133 gram Mg; 1.671 grams K; 0.373 gram Na; 1.148 grams P; 0.528 gram Cl; 1.119 grams S; 0.0055 gram Fe.

[6]Probably contained some added salt.

Table 2. Percentages of Mineral Elements in Food (Continued)

	Calcium	Magnesium	Potassium	Sodium	Phosphorus	Chlorine	Sulfur	Iron
Hominy	.011	.058	.174	?	.070	.046	?	(.001)
Honey	.005	.006	?	.005	.016	.019	.005	.0009
Huckleberries	.026	.010	.065	.016	.020	.008	.011	.0009
Kale	.181	.037	.387	.052	.067	.122	.115	.0025
Kidney	.016	.021	.238	.230	.287	.246	.190	.0065
Kohlrabi	.078	.037	.371	.050	.057	.053	.050	.0007
Lamb (Mutton)	.015	.024	.301	.084	.208	.085	.211	.0030
Lemon (or juice)	.021	.009	.148	.013	.012	.004	.008	.0003
Lentils, dry	.098	.086	.835	.057	.368	.060	.277	.0083
Lettuce [7]	.054 [8]	.011	.311	.030	.031	.073	.018	.0011 [8]
Liver	.008	.022	.298	.087	.373	.101	.251	.0121
Loganberries, fresh and canned	.027	.018	.177	.002	.024	.011	.011	.0021
Macaroni	.021	.034	.174	.018	.147	.052	.146	.0013
Mackerel	.015	.033	.418	.153	.261	.152	.197	.0011
Maple sirup	.163	.019	.242	.011	.014	.028	.004	*
Meat [9]	.....	.....	.....	.....	.....	.....	.....	.....
Milk, cow's	.118	.012	.143	.051	.093	.106	.034	.0002
Molasses**	.246	.081	1.238	.043	.034	.501	.050	.0093
Mushrooms	.014	.016	.384	.027	.098	.021	.051	.0007
Muskmelon	.017	.017	.249	.043	.016	.040	.015	.0004
Mutton	.015	.024	.301	.084	.208	.085	.211	.0030
Oatmeal (Oats)	.081	.145	.431	.071	.365	.049	.199	.0052
Okra, seeds included	.072	.038	*	*	.062	*	.014	.0007
seeds removed	.075	.043	*	*	.053	*	*	.0007
Olives [10]	.101	.012	.809	1.189 [3]	.015	1.877 [3]	.032	.0020
Onions	.032	.015	.183	.015	.044	.024	.068	.0005
Orange (or juice)	.025	.010	.181	.010	.019	.004	.008	.0003
Oysters	.068	.039	.204	.471	.172	.628	.180	.0071
Parsley	.193	*	*	*	.084	*	*	.0043
Parsnips	.057	.029	.417	.008	.080	.035	.026	.0007
Peaches	.009	.011	.256	.015	.018	.005	.007	.0003
Peanuts	.066	.167	.614	.039	.392	.041	.226	.0019
Pears	.013	.009	.129	.008	.016	.004	.007	.0003
Peas, dry	.073	.140	.979	.089	.397	.044	.196	.0060
fresh	.022	.027	.284	.019	.122	.033	.056	.0019
Pecans	.089	.152	*	*	.335	.050	.113	.0026
Pepper, green	.011	.012	.186	*	.025	.019	.019	.0004
Persimmons	.022	.009	.292	.011	.021	.002	.005	.0003
Pineapple	.016	.011	.214	.014	.011	.046	.007	.0003
Plums	.017	.011	.232	.004	.020	.002	.055	.0005
Pork, med.-lean	.010	.024	.304	.069	.215	.069	.206	.0022

[7]Though several investigators have published at least partial analyses, the evidence available at time of writing does not show how far the varieties of lettuce differ in composition.

[8]Higher in loose-leaf than in headed lettuce.

[9]Average meat is estimated to contain per 100 grams protein as follows: 0.058 gram Ca; 0.118 gram Mg; 1.694 grams K; 0.421 gram Na; 1.078 grams P; 0.378 gram Cl; 1.146 grams S; 0.0150 gram Fe.

[10]Pickled in brine.

**The figures here given for molasses, based on findings reported by Sheets and Pearson (Mississippi Agr. Expt. Sta., Tech. Bull. No. 22, 1936) are probably applicable only to the extreme type of "genuine old-fashioned molasses of the deep South." The composition of what is usually called molasses, throughout the United States generally, is probably more nearly approximated by the data for Syrups as listed farther on in this table.

Table 2. Percentages of Mineral Elements in Food (Continued)

	Calcium	Magnesium	Potassium	Sodium	Phosphorus	Chlorine	Sulfur	Iron
Pork (10% protein)	.006	.012	.160	.042	.108	.038	.115	.0015
Potatoes	.013	.027	.496	.024	.053	.035	.029	.0011
Prunes, dry	.062	.040	.848	.078	.093	.000	.028	.0035
Pumpkins	.021	.012	.457	.054	.044	.040	.013	.0008
Radishes	.037	.015	.220	.064	.031	.037	.031	.0010
Raisins	.055	.035	.708	.087	.110	.045	.042	.0030
Raspberries, seeds included	.040	.023	.100	.003	.037	.022	.018	.0009
seeds removed	.024	.020	(.14)	(.04)	.207	*	(.01)	(.0009)
Raspberry juice	.024	.016	.134	.005	.012	*	.000	(.0008)
Rhubarb	.051	.016	.358	.017	.025	.053	.008	.0005
Rice, entire	.008	.110	.342	.078	.330	.023	?	?
white	.009	.028	.070	.028	.092	.006	?	.0007
Rye, entire	.061	.155	(.45)	.061	.360	(.04)	.140	.0048
flour	.018	.081	(.45)	.010	.278	(.04)	.134	.0013
Salmon	[11]	.020	.316	?	.280	?	.226	.0009
Shrimps	.075	.074	.404	?	.210	?	?	.0020
Syrups [12]	(.04)	(.01)	(.24)	?	(.014)	.042	?	(.004)
Soybean flour	.216	.223	?	?	.583	.024	(.9)	(.0027)
Spinach	[13].083	.055	.409	.084	.048	.065	.027	.0034
Squash:								
summer seeds removed	.015	.008	.150	.002	.015	*	*	.0004
winter, seeds removed	.009	.011	.320	.004	.028	*	*	.0006
Strawberries	.022	.012	.145	.007	.022	.011	.012	.0009
Sweet potato	.033	.024	.373	.027	.052	.085	.026	.0008
Tapioca	.012	.002	.020	.004	.012	.016	.004	(.001)
Tomatoes, seeds included	.011	.012	.268	(.02)	.027	(.04)	.014	(.0005)
seed removed	.006	.010	.220	(.02)	.020	(.04)	.008	.0006
Tomato juice	.007	.010	.310	.015	.015	.055	.005	(.0006)
Turkey	.023	.028	.367	.130	.320	.123	.234	.0038
Turnip(s)	.051	.016	.327	.066	.032	.052	.058	.0005
Turnip tops	.254	.010	.370	.045	.058	.002	.054	.0035
Veal, med.-lean	.012	.023	.359	.080	.221	.077	.203	.0024
Vinegar	.015	.011	.150	.020	.015	.046	.018	.0004
Walnuts	.083	.134	.525	.023	.380	.036	.146	.0021
Watercress	.168	.028	.301	.080	.041	.100	.147	.0020
Watermelon	.007	.010	.121	.020	.012	.008	.009	.0002
Wheat, entire	.057	.165	.405	.060	.374	.049	.171	.0057
Wine (average)	.009	.007	.104	.008	.015	.002	.015	(.0003)

[11] The calcium content of the edible flesh of fresh salmon, carefully freed from bone, averages about 0.015 per cent. Canned salmon, however, ordinarily includes the bone, and according to the U. S. Department of Commerce, this should be reckoned as consumable and nutritionally available. With bone thus included, the calcium content of salmon averages about 0.104 per cent.

[12] Data here given are averaged from analyses of sirups of several types commonly sold for use as table sirups and in cooking. Such sirups are often called molasses. The differences in mineral composition, both between the different kinds of sirups and between sirup and molasses, are relatively large.

[13] Not nutritionally available.

TABLE 3. ALKALINE OR BASE-FORMING FOODS [1]

(Approximate potential acidity †)

FOOD	PER 100 GRAMS	FOOD	PER 100 GRAMS
Fruits		Nuts	
Apples *	3.0	Almonds	12.3
Apricots		Chestnuts	7.4
fresh, raw	6.8	Vegetables	
cooked	7.7	Asparagus	0.8
canned	6.9	Beans, Navy dried *	10.0
dried	36.6	lima, dried	41.7
dried, cooked	17.4	lima, fresh	14.0
Bananas *	8.0	string, fresh	5.0
Cantaloupe	7.0	Beets, fresh	10.0
Citron	9.0	Brussels sprouts	4.3
Coconut	7.0	Cabbage	4.5
Currants, dried	5.9	Carrots	14.0
Dates	9.0	Cauliflower	5.3
Figs, fresh	10.0	Celery	7.7
Grapefruit	6.4	Chard	15.8
Grape juice	3.9	Cucumbers	7.9
Grapes	3.5	Kale	4.0
Lemon, or juice	4.0	Lettuce	7.4
Muskmelon *	7.0	Mushrooms	4.0
Olives	41.1	Onions, green	1.0
Orange, or juice *	5.0	Parsnips	12.0
Peaches, fresh	5.0	Peas, dried	7.1
Pears, fresh	4.0	fresh	1.3
Pineapple, fresh	6.8	Potatoes, white *	9.0
Raisins	23.7	Pumpkin	1.5
Strawberries	3.5	Radishes	5.0
Watermelon	4.0	Rutabagas	8.0
Buttermilk	2.2	Soybeans	highly alkaline
Milk, whole raw	2.3	Spinach	27.1
Molasses	56.0	Sweet potatoes	6.0
		Tomatoes	5.6
		Turnip tops, boiled	2.3
		Turnips	5.2

† c.c. normal alkali.

* These foods have been found experimentally to be very efficient in reducing the acidity of the urine.

[1] Compiled from H. C. Sherman, *Chemistry of Food and Nutrition*, 6th ed., New York: The Macmillan Co., 1941; Sherman and A. O. Gettler, "The Balance of Acid-Forming Elements in Foods," in *Journal Biol. Chem.*, 11 (1912), 323; Sansum, Blatherwick, and Smith, in *Journal Am. Med. Assoc.*, 81 (1923), 883; Bureau of Human Nutrition and Home Economics, U. S. Department of Agriculture Circular 411, 1935; and M. A. Bridges, *Dietetics for the Clinician*, 4th ed., Philadelphia: Lea & Febiger, 1941. See also Acid-Base Reaction in Table 1.

TABLE 3. ACID-FORMING FOODS

(Approximate potential acidity †)

FOOD	PER 100 GRAMS	FOOD	PER 100 GRAMS
Breads, Cereals, Crackers		Beef, lean	12.0
Barley, pearled	10.4	porterhouse	10.9
Bread		ribs, lean	9.6
white	7.1	round steak	11.0
white, made with water	6.0	Chicken	10.7
whole wheat	7.3	Frog	10.4
Cereals, whole-wheat	12.0	Halibut	9.3
Corn, green	1.8	Ham, smoked	8.3
sweet, dried	5.3	Lamb or mutton, leg	9.6
Corn meal	5.3	Oysters, fresh	15.1
Crackers, soda	8.3	Perch	6.3
Oatmeal	12.0	Pork, lean	10.0
Rice	9.0	Rabbit	14.8
White flour	9.6	Salmon, canned	10.7
Wheat, shredded	12.2	fresh	8.8
Egg, white	4.8	Sardines	11.3
whole	11.0	Trout, fresh	8.8
yolk	25.0	Veal, loin	9.8
Fruits		Miscellaneous	
Cranberries *	3.2	Cheese, Cheddar	5.4
Plums *	5.5	Lentils	5.1
Prunes *	10.6	Peanuts	3.9
Meat, Poultry, Fish, and Shellfish		Walnuts	7.8
Bacon	5.0		

† c.c. normal acid.

* Although these foods yield an alkaline ash they are classified as acid-forming foods because they give rise to hippuric acid in the body and thus increase the acidity of the urine.

TABLE 4. ALCOHOLIC BEVERAGES [1]

ALCOHOL—7 CALORIES PER GRAM

KIND	AMOUNT	GMS.	C	P	F	CAL.
1. Distilled liquors (whisky, gin, rum, brandy)	3½ oz.	100	None or trace	0	0	. . .
2. Wines,* *dry* (carbohydrate range, trace to 3.6 per cent)	3½ oz.	100	0.3	0	0	64.0
sweet (carbohydrate range 0.1-40.7 per cent)	3½ oz.	100	8.0	0	0	95.8
3. Cordials ** (crême de menthe, kümmel, benedictine, anisette, chartreuse)	3½ oz.	100	30.0	0	0	423.0
4. Beer † (average of several brands)	3½ oz.	100	5.0	0	0	52.0
5. Ale ††	3½ oz.	100	5.1	0	0	52.0
6. Malt extract, *commercial*						
true	3½ oz.	100	10.6	0	0	43.5
concentrated	3½ oz.	100	71.3	0	0	292.3
7. Cider ‡ (carbohydrate range 0-13.5 per cent)	3½ oz.	100	4.5	0	0	48.5
8. Carbonated drinks (bottled soda, sarsaparilla, birch beer, root beer, ginger ale)	3½ oz.	100	8.0	0	0	32.8

VITAMIN B COMPLEX CONTENT OF BEERS, ALES AND MALT TONICS

(Micrograms/100 grams)

	Thiamine	*Riboflavin*	*Niacin*	*Pantothenic Acid*
Beer	0.1–15	25–40	750–900	85–120
Ale	0.1–15	30–45	700–900	90–105
Malt Tonic	0–70	40–50	1000–1800	100–135

* Natural wines contain 6 to 12 per cent alcohol; "fortified" wines 15 to 20 per cent.
** Range of alcohol content, 35 to 50 per cent.
† Range of alcohol content for beer, generally 4 to 5 per cent.
†† Range of alcohol content, same as for beer.
‡ Range of alcohol content, generally 2.5 to 6 per cent.

[1] Schwarz Laboratories, Inc., Brewery Consultants and Engineers, New York City.

TABLE 5. ARSENIC[1]

FOODS TO BE OMITTED IN CASE OF ARSENIC POISONING

Apples
Apricots
Asparagus
Beer
Blackberries
Blueberries
Breadstuffs
Broccoli
Brussels sprouts
Cabbage
Candy
Canned foods
Cauliflower
Celery
Cherries
Chili powder
Chocolate
Cod-liver oil
Collards
Cranberries
Currants
Foil-wrapped foods
Fruit juices
Gooseberries
Grapes
Ice cream, commercial
Kale
Liver
Orange or lemon rind or gratings
Peaches
Pears
Peppers
Plums
Sea foods, except whitefish
Soft drinks
Spinach
Strawberries
Syrups, except pure maple
Vinegar
Watercress
Wine
Yeast

FOODS TO BE USED IN CASE OF ARSENIC POISONING

Bananas
Beans, navy and lima
Coffee
Corn
Cucumber
Dairy products (milk, cream, eggs, unwrapped cheese)
Eggplant
Ice cream, home-made
Lemon juice
Lettuce, leaf, well-washed
Meats
Melons
Peas, fresh
Rhubarb (cooked with brown or maple sugar)
Root vegetables (potatoes, carrots, onions, beets)
Squash and pumpkin
Tea
Tomatoes, fresh, peeled

TABLE 6. CALCIUM

For calcium content of foods see:

Calcium—Food Sources p. 28
Calcium in 100-Gram Portions and Average Servings pp. 28, 637
Mineral Elements of Foods p. 667

[1] Milton A. Bridges, M.D., *Dietetics for the Clinician,* 4th ed., Philadelphia: Lea & Febiger, 1941.

TABLE 7. CARBOHYDRATES [1]

For calculating the carbohydrate content of diabetic diets, it is convenient to group the fruits and vegetables into several classes so that all those in any one class may be calculated at the same carbohydrate content.

A. FRUITS [2] AND VEGETABLES CLASSIFIED AS TO CARBOHYDRATE CONTENT [3]

In the following classification there are six groups, in which carbohydrate is calculated at the percentages indicated. Most fruits and vegetables, whether fresh or canned, fall into these six classes. A few, however, are too high in carbohydrate to come in any of these groups, and they are listed in a miscellaneous group.

3% CARBOHYDRATE (NITROGEN-FREE EXTRACT) [4]

Asparagus, canned, including sieved
Asparagus-bean sprouts
Bamboo shoots
Beans, green and waxed canned, including sieved
Bean sprouts (from mung beans)
Beet greens
Broccoli
Cabbage
Cabbage, Chinese
Cauliflower
Cauliflower, canned
Celery
Celery, canned, sieved
Chard
Chayote, leaves
Chicory, leaves
Corn salad
Cress, garden
Cucumbers
Dock
Endive
Escarole
Fennel
"French endive"
Lettuce
Mustard greens
Pokeberry, or poke shoots
Purslane
Radishes
Rhubarb
Rhubarb, canned, w.p.
Rutabaga tops
Sauerkraut
Sauerkraut, canned
Sea kale
Sorrel
Spinach
Spinach, canned, including sieved
Spinach, New Zealand
Squash, summer
Taro shoots
Tomatoes
Tomatoes, canned
Tomato juice
Tomato juice, canned
Turnip tops
Vegetable marrow
Vinespinach
Watercress

6% CARBOHYDRATE (NITROGEN-FREE EXTRACT) [4]

Amaranth
Beans, hyacinth-bean pods
Beans, scarlet runner green pods
Beans, snap, green and wax
Blackberries, canned, w.p.
Cantaloupe
Carrots, canned, including sieved
Celery root, or celeriac
Chayote, fruit
Chives
Collards
Dandelion greens
Dasheen, leaves and stems
Eggplant
Gooseberries, canned, w.p.
Jew's mallow

[1] Bureau of Human Nutrition and Home Economics, U.S. Dept. of Agriculture, Washington, D. C. See also Joslin's carbohydrate table, pp. 271-272, and Table 1, pp. 637-666.

[2] The canned fruits included here are all water-packed products, designated as w.p. in the lists.

[3] G. Adams and C. Chatfield, *Journal Am. Diet. Assoc.* X (1935), 383. Revised by the Bureau of Human Nutrition and Home Economics, Food Composition Section, 87—R 2, 1941.

[4] Total carbohydrate excluding fiber.

6% CARBOHYDRATE (NITROGEN-FREE EXTRACT)—(Continued)

Kale
Kohlrabi
Lamb's-quarters
Leeks
Melons, honeydew, casaba, and Spanish
Muskmelons
Nettle
Okra
Onions, Welsh
Palmetto or palmetto cabbage
Parsley
Peaches, canned, w.p.
Peppers, green and red
Pimientos, canned
Plums, excluding prunes, canned, w.p.
Pumpkin
Pumpkin and squash, canned
Soybeans,[5] green shelled
Soybeans sprouts
Squash, cushaw
Squash, winter
Strawberries
Strawberries, canned, w.p. and j.p.
Strawberry juice
Sweet potato tops
Taro, leaves and stems
Turnips
Watermelon

9% CARBOHYDRATE (NITROGEN-FREE EXTRACT) [4]

Applesauce, canned, unsweetened
Apricots, canned, w.p.
Artichokes, globe or French
Asparagus-beans pods
Beets
Beets, canned, including sieved
Blackberries
Blackberries, canned, j.p.
Blackberry juice
Blueberries, canned w.p. and j.p.
Brussels sprouts [5]
Cape-gooseberry
Carrots
Cherries, red, white, canned, w.p.
Chervil
Cranberries
Currants
Currant juice
Gingerroot
Gooseberries
Grapefruit
Grapefruit, canned, w.p. and j.p.
Grapefruit juice
Groundcherry
Lemons
Lemon juice
Lemon juice, canned
Limes
Limes, sweet
Lime juice
Loganberries, canned, w.p.
Loganberry juice
Mamey
Mammee apple
Onions
Oranges, mandarin type
Orange juice, mandarin type
Papayas
Parsley, Hamburg
Peaches, canned, j.p.
Pears, canned, w.p.
Peas,[5] very young
Peas, canned including sieved
Peas,[5] "sugar peas," green pods
Poha
Pricklypear
Prunes, canned, w.p.
Quince juice
Raspberries, canned, w.p.
Rutabagas
Tangerines
Tangerine juice

12% CARBOHYDRATE (NITROGEN-FREE EXTRACT) [4]

Apple juice
Apricots, canned, j.p.
Apricots
Apricots, canned, j.p. sieved, unsweetened
Beans,[5] lima, green, canned
Cherries, sour
Cherries, red and white, canned, j.p.
Crab apple juice
Figs, canned, w.p.
Grapefruit juice, canned, unsweetened
Grapes, canned, w.p.
Guavas
Kumquats
Lambsquarters, Algerian
Loganberries
Loganberries, canned, j.p.
Loquats
Mulberries
Oranges
Oranges, Seville or sour
Orange juice
Orange juice, canned
Peaches
Peaches, canned, sieved, unsweetened
Peach juice

[5] This vegetable admits of classification on the basis of its carbohydrate content, but cannot be calculated at the protein for this group. For data on its carbohydrate, protein, and fat content see "Fruits and Vegetables, Miscellaneous Group," p. 678.

12% carbohydrate (nitrogen-free extract)—(Continued)

'ears, canned, j.p.
'ineapple
'ineapple, canned, w.p.
'ineapple juice
Pineapple juice, canned
Plums (excluding prunes)
Quinces
Raspberries
Raspberries, canned, j.p.
Raspberry juice
Rose apple
Soybeans, dry seeds

15% carbohydrate (nitrogen-free extract)[4]

pples
ans, broadbeans, green, shelled
ans,[5] red kidney, canned
ack-salsify
ueberries
ueberry juice
ierries, black, canned, w.p.
Corn,[5] very young
Grapes
Huckleberries
Huckleberry juice
Jerusalem artichoke, tubers
Mangoes
Nectarines
Onions, top onions
Pawpaws
Parsnips
Pears
Peas,[5] medium
Pineapple, canned, j.p.
Salsify
Shallot
Vegetable-oyster or salsify

18% carbohydrate (nitrogen-free extract)[4]

ans,[5] baked, canned
iayote, roots
ierries, sweet
ierries, black, canned, j.p.
orn, sweet, canned
ab apples
gs
Garlic
Granadilla, purple
Grape juice, fresh or bottled
Haws, scarlet
Horseradish
Natal plum
Passion fruit
Persimmons, Japanese
Pomegranates
Potatoes
Prunes, canned, j.p.
Prune juice, canned
Sapodilla
Sapota
Waternut, tuber

Miscellaneous group (high carbohydrate)

pples, dried
pricots, dried
sparagus-beans, dry
inanas
inanas, dried
ans, broadbeans, dry
ans, kidney or common, dry
ans, lima
ans, lima, dry
ans, mung, dry
irdock
ierimoya
ierries, maraschino, canned
ickpeas, dry
rn (medium and old)
rn, dry, sweet and ield
Cowpeas, green, shelled
Cowpeas, dry
"Currants," dried
Dasheen, tubers
Dates, fresh and dried
Figs, dried
Fruits, canned in syrup (all kinds)
Garbanzo peas, dry
Jujubes, fresh and dried
Lentils, dry, whole and split
Litchi fruit, dried
Marmalade plum
Peaches, dried
Pears, dried
Peas, fresh (old)
Peas, dry, whole and split
Persimmons, native
Plantain, or baking banana
Prunes
Prunes, canned, sieved
Prunes, dried
Raisins, dried
Sapoto
Sugar-apple
Sweet potatoes
Sweet potatoes, canned
Sweetsop
Taro, tubers
Tomato catchup
Yams, winged

Vote: *Avocados,* though not high in carbohydrate are not classified because y are extremely variable in fat content; the fat is apt to be very high.

TABLE 7. CARBOHYDRATES—(Continued)

MISCELLANEOUS GROUP—FOODS THAT MUST BE CONSIDERED INDIVIDUALLY BECAUSE OF THE NATURE OF THE CARBOHYDRATE OR THE NATURE OR QUANTITY OF THE OTHER CONSTITUENTS

FOOD	CARBOHYDRATE %	PROTEIN %	FAT %
Avocados, Fuerte	3	1.5	26.4
Avocados, Guatemalan	4	2.0	17.2
Avocados, Mexican	5	2.0	23.2
Avocados, West Indian	7	1.5	7.7
Beans, baked	17	7.0	2.5
Beans, lima, canned	13	4.0	0.3
Beans, red kidney, canned	17	7.0	0.2
Brussels sprouts	8	4.5	0.5
Corn, sweet, very young	15	3.0	0.8
Mushrooms and truffles	0	0.0	0.0
Peas, green, very young, shelled	10	5.5	0.3
Peas, green, medium, shelled	14	6.5	0.4
Soybeans, green, shelled	6	13.5	6.3

B. ARRANGED BY DR. E. P. JOSLIN [1]

In the following classification there are four groups.

VEGETABLES, FRESH OR CANNED

Reckon average carbohydrate in 5% vegetables as 3%; in 10% vegetables as 6%.

5%		10%	15%	20%
1%-3%	3%-5%	10%	15%	20%
Lettuce Cucumbers Spinach Asparagus Rhubarb Endive Marrow Sorrel Sauerkraut Beet greens Dandelions Swiss chard Celery Mushrooms	Tomatoes Watercress Sea kale Cauliflower Eggplant Cabbage Radishes Leeks String beans, young Broccoli French artichokes Green peppers Summer squash Kohlrabi	String beans Brussels sprouts Pumpkin Turnip Squash Okra Beets Carrots Onions Green peas, very young	Green peas Jerusalem artichokes Parsnips Lima beans, young	Potatoes Shell beans Baked beans Lima beans Green corn Boiled rice Boiled macaroni

[1] E. P. Joslin, *Diabetic Manual*, 7th ed., Philadelphia: Lea & Febiger, 1941.

TABLE 7. CARBOHYDRATES—(Continued)

FRUITS, FRESH OR CANNED (WATER-PACKED)

Approximate Carbohydrate Substitution Values

Food	Carbohydrate 10 Gm.	Carbohydrate 15 Gm.	Food	Carbohydrate 10 Gm.	Carbohydrate 15 Gm.
rapefruit pulp	150	225	Plums	80	120
trawberries	150	225	Pineapple	70	105
Vatermelon	150	225	Apple	70	105
antaloupe	150	225	Honeydew melon	70	105
lackberries	120	180	Blueberries	70	105
range pulp	100	150	Cherries	60	90
ears	90	135	Banana	50	75
eaches	90	135	Prunes (cooked)	50	75
pricots	80	120	Ice cream	50	75
aspberries	80	120			

AVERAGE VALUES FOR CALCULATION OF PROTEIN AND FAT OF FRUITS AND VEGETABLES IN THE SEVERAL CARBOHYDRATE GROUPS [1]

	FRUITS		VEGETABLES	
CARBOHYDRATE %	PROTEIN %	FAT %	PROTEIN %	FAT %
3	0.7	0.3	2.0	0.3
6	0.7	0.3	2.0	0.3
9	0.7	0.3	2.5	0.3
12	0.7	0.3	. . .	. . .
15	0.7	0.3	2.5	0.3
18	0.7	0.3	2.5	0.3

TABLE 8. CELLULOSE [2]

FOODS HIGHEST IN CELLULOSE (ROUGHAGE)

pples, whole
sparagus
ananas
eans
eets
erries
ran products
arrots
auliflower
elery
orn
ates
ggplant
igs
rapes
Horse-radish
Kohlrabi
Leafy vegetables
Lentils
Melons
Mushrooms
Nuts
Okra
Onions
Parsnips
Peaches, whole
Pears, whole
Peas
Peppers, green
Plums
Pomegranates
Prunes
Pumpkin
Radishes
Raisins
Rhubarb
Salsify
Spinach
Squash
Sweet potatoes
Turnips
Whole grain cereal products
Yams

[1] G. Adams and C. Chatfield, *Journal Am. Diet. Assoc.*, X (1935), 383.

[2] Milton A. Bridges, M.D., *Dietetics for the Clinician*, 4th ed., Philadelphia: Lea & ebiger, 1941.

TABLE 8. CELLULOSE—(Continued)

FOODS LOWEST IN CELLULOSE (ROUGHAGE)

Alimentary pastes	Eggs	Molasses
Arrowroot flour products	Fish	Mollusks
Beef juice	Fruit juices	Oils
Butter	Gelatin	Puréed foods
Cakes, crackers, biscuits (refined flour)	Gruels	Sago
Cereals, strained	Honey	Soups, strained
Cheese	Ice cream	Starches
Cherries	Jellies	Sugars
Chicken	Mayonnaise	Vegetable juices
Cream	Meats	White bread
	Milk	White potatoes

TABLE 9. CHLORIDES [1]

FOODS HIGHEST IN CHLORIDES

These items contain more than 100 mg. of Cl per 100 grams.

(IN ORDER OF DECREASING PERCENTAGE)

Caviar	Graham crackers	Butter, salt-free
Butter	Malted milk	Celery
Meat juice	White bread	Egg white
Rye bread	Molasses	Corn meal, yellow
Clams	Condensed milk	Bananas
Cheddar cheese	Coconut, shredded	Coconut, fresh
Canned beef	Dates	Whey
Graham bread	Fish, white, fried	Bread, white, salt-free
Boston brown bread	Turnip greens	Skim milk
Oysters	Endive	Whole milk

All brined, corned, pickled, smoked, and salt foods.

FOODS LOWEST IN CHLORIDES [1]

Apple butter	Eggplant	Mustard, dry
Barley, pearled	Figs, fresh	Onions
Berries	Fruit juices	Orchard fruits
Buckwheat	Goat milk	Parsnips
Cabbage	Grapes	Peas, fresh
Chestnuts	Honey	Peppers, green
Citrus fruits, except limes	Jellies	Pomegranates
Corn	Lima beans	String beans
Cucumbers, fresh	Maple syrup	Tapioca
Currants, fresh	Mushrooms	Watermelon

[1] *Ibid.*

TABLE 10. CHOLESTEROL [1]

FOODS HIGHEST IN CHOLESTEROL

Brains	Liver	Lard
Egg yolk	Sweetbreads	Meats and poultry
Fish roe	Butter	Oysters
Kidney	Fish	Suet

FOODS LOWEST IN CHOLESTEROL

Breadstuffs	Nuts
Egg white	Sugars and Syrups
Cereals	Vegetables
Fruits	Vegetable Oils

TABLE 11. COPPER [1]

FOODS HIGHEST IN COPPER
(IN ORDER OF DECREASING PERCENTAGE)

Calves' liver	Filberts	Pickles, sweet
Cocoa, dry	Almonds	Lobster
Oysters	Pistachio nuts	Coconut
Chocolate	Butternuts	Olives
Beef liver	Wheat bran	Bacon, cooked crisp
Molasses	Currants, dried	Oatmeal
Mushrooms	Walnuts, English	Tomato catsup
Hickory nuts	Peanuts	Graham flour
Brazil nuts	Legumes, dried	Corn
Pecans		

These items contain more than 0.50 mg. per 100 grams.

TABLE 12. FAT

FOODS HIGHEST IN FAT [1]

Containing more than 20% Fat

Avocado	Egg yolk	Oils, except mineral oil
Bacon	Fatty meats	Olives
Bone marrow	Fried foods	Pastry
Butter	Goose	Potato chips
Catfish	Lard	Salad dressings
Caviar	Mackerel, salt	Sardines in oil
Cheese, whole milk	Margarine	Sausage
Chocolate	Meats, except very lean	Suet
Cocoa	Nut butters or pastes	Turkey
Cookies	Nuts, except litchi nuts and chestnuts	Whole milk powder
Cream		

[1] *Ibid.*

TABLE 12. FAT—(Continued)

FOODS LOWEST IN FAT [1]

Containing negligible amounts

Apples	Cranberry sauce	Jams	Onions	Root vegetables
Apricots	Cucumber	Jellies	Pears	Salad greens
Asparagus	Currants	Litchi nuts	Peaches	Sauerkraut
Bouillon	Egg white	Marmalade, orange	Peas	Squash
Cabbage	Figs	Marshmallow	Peppers	Strawberries
Candy	Fruit juices	Meat juice	Pickles	String beans
Celery	Gelatin	Melons	Pineapple	Sugars
Citrus fruits	Greens	Molasses	Plums	Syrups
Cod	Haddock	Mushrooms	Potatoes	Tapioca
Consomme	Hominy	Okra	Radishes	Tomatoes
Cornstarch	Honey		Rhubarb	Vinegar
			Rice	Watermelon

TABLE 13. FLATULENCE [2]

FOODS PRODUCING FLATULENCE

Beverages
- Carbonated waters
- Highly sweetened drinks
- Malt beverages
- Soft drinks
- Sparkling wines

Desserts
- All sweet foods, such as
  - Candy
  - Clear sugar
  - Honey
  - Jam
  - Maple sugar, etc.

Fruits
- Apples, fresh
- Cantaloupe
- Raisins
- Watermelon

Soups
- Meat broths, especially stock soups containing any of the following gas-forming vegetables

Other Substances
- Cold fried foods
- Condiments
- Excessively salted foods
- Extremely hot or cold foods
- Nuts
- Some uncooked foods
- Spices

Cheese
- All highly fermented cheeses

Vegetables
- Beans, dry
- Broccoli
- Brussels sprouts
- Cabbage
- Cauliflower
- Cucumbers
- Garlic
- Lentils
- Lettuce
- Onions
- Peas, dried
- Peppers, green, red
- Radishes
- Swiss chard
- Turnips

[1] Compiled from various sources.
[2] Bridges, *op. cit.*

TABLE 14. HEMOGLOBIN [1]

FOODS MOST EFFECTIVE IN INCREASING HEMOGLOBIN

Apples	Brains	Lettuce, green
Apricots	Calves' liver	Peaches
Asparagus	Chicken gizzard	Pig kidney
Beef heart	Chicken liver	Pineapple
Beef kidney	Fish liver	Prunes
Beef liver	Lamb kidney	Raisins
Beef spleen	Lamb liver	Strawberries
Bone-marrow		

Each of the following foods contains a high amount of iron, manganese, and copper. They may be additionally infiltrated into any diet where increased hemoglobin is desired.

Almonds	Cocoa	Pineapple
Beans, kidney	Filberts	Pistachio nuts
Beans, lima	Lentils	Spinach
Beef juice	Liver, calves'	Walnuts
Cherries, fresh	Olives, green	Watercress
Chocolate	Parsley	Wheat bran

The preceding foods contain a low or negligible amount of carbohydrate.

TABLE 15. IODINE [1]

FOODS HIGH IN IODINE

Agar-agar	Irish moss	Oysters
Clams	Leafy vegetables	Salmon
Crabmeat	Lobster	Salt-water fish
Eggs	Mushrooms	Shellfish liquor
Fish liver oils	Mussels	Watercress
Fish roe		

TABLE 16. IRON

For iron content of foods see:

Iron—Food Sources	p. 31
Iron in 100-Gram Portions and Average Servings	pp. 637-666
Mineral Elements of Foods	pp. 667-670

[1] *Ibid.*

TABLE 16. IRON—(Continued)

FOODS CLASSIFIED AS SOURCES OF IRON [1]

ANIMAL FOODS

Rich in Iron

Eggs, especially the yokes	Heart	Dark meat and poultry
Liver	Lean muscle of beef	Oysters
Kidney	Veal	Shrimps
Brain	Pork	
	Lamb	

VEGETABLE FOODS

Excellent (Iron Content 0.00160 Per Cent or More)

Beans, lima	Collards	Peas, English garden
Beet tops	Cowpeas	Spinach
Broccoli leaves	Dandelion greens	Turnip tops
Celeriac leaves	Kale	Vegetable oyster
Chard	Mustard greens	Watercress
Chives	Parsley	

Good (Iron Content from 0.00080 to 0.00159 Per Cent)

Artichokes, leaf base	Brussels sprouts	Leek leaves
Artichokes, whole head	Cabbage, green	Lettuce, green
Asparagus	Cabbage, red	Onion tops
Beans, green, string	Cauliflower	Pumpkin
Beets	Dock or sorrel	Potatoes
Blackberries	Endive, partly green	Quinces
Blueberries	Escarole	Radishes
Broccoli, sprouting	Grape skin, Concord	Raspberries

Fair (Iron Content from 0.00040 to 0.00079 Per Cent)

Apricots	Finochio	Parsnips
Avocados	Gooseberries	Peppers, green
Bananas	Grapes	Peppers, red
Beans, yellow wax	Kohlrabi	Plums
Cabbage	Kumquats	Pomegranates
Carrots	Leeks	Potatoes, new
Celeriac root	Leek bulbs	Rhubarb
Celery cabbage	Lemon peel	Squash, winter
Celery stalk	Lemon pulp	Strawberries
Cherries, black	Lettuce, head	Sweet corn
Cherries, red	Mushrooms	Sweet potatoes
Chicory	Okra	Tangerines
Cranberries	Onions, mature	Tomatoes
Currants	Onions, young	Turnips
Eggplant	Oranges	

[1] H. K. Siebling, *Iron Contents of Fruits and Vegetables,* Circular No. 205, U.S. Department of Agriculture, Washington, D. C., 1932.

TABLE 16. IRON—(Continued)

Poor (Iron Content Less Than 0.00040 Per Cent)

Apples	Orange juice	Pineapples
Cucumbers	Peaches	Rutabagas
Grapefruit	Pears	Squash, summer
Lemon juice	Persimmons, Japanese	Watermelon
Muskmelon		

TABLE 17. MANGANESE [1]

FOODS HIGHEST—DECREASING PERCENTAGE

Blueberries	Chocolate, bitter	Kidney beans, dried
Graham flour	Oatmeal, uncooked	Barley, entire
Filberts	Peas, dried	Peanuts
Chestnuts	Beans, navy, dried	Turnip greens
Cocoa, dry	Buckwheat flour	Coconut, fresh
Pecans	Almonds	Bread, rye
Wheat, entire	Rye flour	Beet greens
Walnuts, black	Walnuts, English	Polished rice
Bread, graham	Brown rice	Lima beans, dried
		Pineapple, fresh

TABLE 18. OXALIC ACID [1]

FOODS HIGHEST—DECREASING PERCENTAGE

Poppyseeds	Spinach	Poke
Lambsquarters	Swiss chard	Pepper, ground
Beet greens	Rhubarb	Sorrel
Purslane	Cocoa	Parsley

FOODS LOWEST—DECREASING PERCENTAGE

Animal foods	Cucumbers	Nectarines
Apples	Grapefruit	Peas
Avocados	Lemon juice	Plums
Cauliflower	Lime juice	Radishes
Cherries	Melons	Squash, summer
Cress	Mustard greens	Turnips

TABLE 19. PHOSPHORUS

For phosphorus content of foods see:

Phosphorus—Food Sources	p. 30
Phosphorus in 100-Gram Portions and Average Servings	pp. 637-666
Mineral Elements of Foods	pp. 667-670

[1] Bridges, *op. cit.*

TABLE 20. POTASSIUM[1]

FOODS HIGHEST IN POTASSIUM

Bananas
Cabbage greens
Caviar
Cereals
Cocoa
Condensed milk
Dandelion greens
Dried fruits
Endive
Guavas
Honey
Horse-radish
Kohlrabi
Legumes
Lettuce
Limes
Meat extracts
Meats and fish
Melons
Molasses
Mushrooms
Mustard
Nuts
Olives
Paprika
Parsnips
Pepper, black
Potatoes, white and sweet
Rutabagas
Spinach
Truffles
Turnips

FOODS LOWEST IN POTASSIUM

Apples
Asparagus
Bacon
Berries
Bread, rye, white
Butter
Buttermilk
Cheese
Citrus fruits
Clams
Corn, green
Crackers
Cream
Cucumbers
Eggplant
Eggs
Farina
Fruit juices (except pineapple and tomato)
Grapes
Hominy
Macaroni
Milk
Okra
Onions
Oysters
Pears
Peppers, green
Pork
Rice, white
Soup
Squash, summer
Watermelon

TABLE 21. PROTEIN FOODS

Meat, Cooked	AVERAGE SERVING	GRAMS	PROTEIN	FAT	CARBOHYDRATE	CALORIES
Beef						
Chipped, dried	1 oz.	30	30	10	2	58
Corned beef	4 oz.	120	22	16	0	229
Kidney	3 oz.	90	90	14	7	122
Roast, rib	4 oz.	120	21	28	0	332
Chops, lean	4 oz. or 1 large, (E.P.)	90	16	16	0	113
Scraped beef	4 oz.	120	23	16	0	232
Steak, beef, muscle	4 oz.	120	23	16	0	243
Sweetbreads, medium fat	3 oz.	90	11	30	0	310
Veal						
Cutlet, lean	4 oz.	120	23	15	0	223
Liver	3 oz.	90	17	4	0	122

[1] *Ibid.*

TABLE 21. PROTEIN FOODS—(Continued)

Meat, Cooked *Lamb*	AVERAGE SERVING	GRAMS	PRO-TEIN	FAT	CARBO-HY-DRATE	CALO-RIES
Chops, medium fat	(A.P.) 4 oz. or 2 med. (E.P.)	120 90	16	16	0	207
Kidneys	3 oz.	90	15	3	0	90
Roast, medium fat	4 oz.	120	22	21	0	276
Pork						
Bacon	2–3 oz. or 3–4 slices	20	4	10	..	113
Chops, lean	4 oz. or 1 large, (E.P.)	90	16	16	0	211
Chops, medium fat	4 oz. or 1 large, (E.P.)	90	15	23	0	262
Frankfurters	4 oz. or 2 frank-furters	120	18	17	0	240
Ham, lean, smoked	4 oz.	120	23	30	4	365
Ham, medium fat	4 oz.	120	20	42	4	460
Fish, Cooked						
Caviar	1 oz. or 2 tbsp.	30	8	5	0	74
Clams	3 oz.	90	12	2	2	70
Cod	3 oz.	90	15	3	0	63
Crab	3 oz.	90	15	1	1	73
Halibut	3 oz.	90	17	5	0	99
Lobster	3 oz.	90	15	2	0	76
Mackerel, Atlantic	3 oz.	90	17	11	0	165
Oysters	3 oz. or 5 large	90	9	2	5	72
Salmon, Atlantic	4 oz.	120	27	16	0	253
Sardines in oil	3 oz.	90	23	10	1	186
Shrimp, canned	2 oz.	60	11	5	5	49
Trout, brook	3 oz. or 1 large	90	17	2	0	86
Tuna in oil	3 oz.	90	22	10	0	175
Fowl, Cooked with	*Skin and Fat*					
Roast chicken	3 oz.	90	19	4	0	113
Broiler	½ of 1½ lb. broiler (E.P.)	90	18	4	0	110
Goose, muscle only	3 oz.	90	20	6	0	138
Duck, muscle only	3 oz.	90	19	5	0	119
Quail	1 medium (E.P.)	70	18	5	0	113
Squab	1 medium (E.P.)	95	9	11	0	130

TABLE 21. PROTEIN FOODS—(Continued)

Eggs	AVERAGE SERVING	GRAMS	PROTEIN	FAT	CARBOHYDRATE	CALORIES
Egg, whole	1 average	50	6	5	0	79
Eggs, white	1	28	3	0	0	13
Egg, yolk	1	16	3	5	0	57
Milk and Cheese						
Buttermilk	½ pint	240	8	2	12	84
Milk, evap., unsweetened	2 tbsp.	30	2	2	3	42
Milk, evap., sweetened	2 tbsp.	30	2	2	16	98
Milk, whole	½ pint	240	8	9	12	166
Milk, skimmed	½ pint	240	8	2	12	84
Milk, dried, whole	2 tbsp.	15	4	4	5	70
Milk, dried, skimmed	2 tbsp.	15	5	0	7	50
American Cheddar cheese, pale	2 slices 2″ x 1½″ x ¼″	40	10	13	1	158
Camembert	1 triangle	40	8	10	0	122
Cream, full	¼ package	25	2	9	0	91
Cottage	3 r. tbsp.	120	23	1	5	121
Limburger	2 slices 2″ x 1½″ x ¼″	40	9	13	0	155
Neufchatel	1 tbsp.	25	3	15	1	146
Roquefort	1 individual pkg.	40	9	13	1	156
Swiss	2 slices 2″ x 1½″ x ¼″	40	11	13	1	162
Nuts						
Almonds	9–10 nuts (E.P.)	10	2	5	2	64
Brazil nuts	4–5 nuts (E.P.)	30	4	20	3	209
Chestnuts	7–8 nuts (E.P.)	35	2	14	27	122
Coconut, fresh	1 slice 2″ x 2″ x ½″	35	1	11	5	133
Coconut, dry	2 tbsp. or ¼ cup	20	1	8	10	116
Filberts	6–8 nuts (E. P.)	10	1	6	2	67
Hickory nuts	15 nuts (E.P.)	15	2	10	2	107
Peanuts, Virginia type	15 nuts (E.P.)	30	8	13	7	180
Pecans	4–5 nuts (E.P.)	15	1	11	2	112
Pistachios	15 nuts (E.P.)	15	3	8	3	96
Walnuts, black	9 halves (E.P.)	15	3	9	3	101
Walnuts, English	9 halves (E.P.)	15	2	9	2	105

TABLE 22. PURINE CONTENT OF CERTAIN FOODS [1]

Foods which contain very large amounts (150 to 1,000 mg.) of purine bodies in 100 Gm.

Sweetbreads	825 mg.	Kidneys (beef)	200 mg.
Anchovies	363 mg.	Brains	195 mg.
Sardines (in oil)	295 mg.	Meat extracts	160–400 mg.
Liver (calf, beef)	233 mg.	Gravies	Variable

Foods which contain a large amount (75 to 150 mg.) of purine bodies in 100 Gm.

Meats:

Bacon, beef, calf tongue, carp, chicken soup, codfish, duck, goose, halibut, liver sausage, meat soups, partridge, perch, pheasant, pigeon, pike, plaice, pork, quail, rabbit, sheep, shellfish, squab, trout, turkey, veal, venison.

Vegetables:

Lentils.

Foods which contain a moderate amount (up to 75 mg.) of purine bodies in 100 Gm.

Meats:

Bluefish, bouillon, chicken, crab, eel, finnan haddie, ham, herring, lobster, mutton, oysters, salmon, shad, tripe, tuna fish, whitefish.

Vegetables:

Asparagus, cauliflower, kidney beans, lima beans, mushrooms, navy beans, peas, spinach.

Breads:

Whole grain bread and breadstuffs as graham bread, graham crackers, oatmeal crackers, rye bread, Ry-Krisp, whole wheat bread, Zed.

Cereals:

Whole grain cereals as Bemax, bran, bran flakes, cracked wheat, Embo, graham porridge, Grapenuts, Krumbles, maltbreakfast food, oatmeal, Pep Bran Flakes, Pettijohns, Puffed Wheat, Ralston's, Sims, Shredded Wheat, Wheaties, Wheat oats, Wheatsworth, Whole Wheat Krumbles.

[1] S. Hench, "Diagnosis and Treatment of Gout and Gouty Arthritis," in *Journal of the American Medical Association,* 116 (February 1941).

To calculate the purines or "purine bodies" in given food the purine nitrogen is multiplied by 3. Example: 200 mg. of purine nitrogen equals 600 mg. of purine bodies.

TABLE 22. PURINE CONTENT OF CERTAIN FOODS—(Continued)

Foods which contain an insignificant amount of purine or no purine:

1. Beverages
   - Carbonated
   - Chocolate
   - Cocoa
   - Coffee
   - Fruit juices
   - Postum
   - Tea
2. Butter *
3. Breads and breadstuffs (except whole grain under list 3)
   - Benson's water crackers
   - Butter thins
   - Cornbread
   - Corn sticks
   - French bread
   - Gluten bread
   - Holland rusk
   - Soda crackers
   - Uneeda Biscuit
   - Water rolls
   - White bread
   - Zwieback
4. Caviar
5. Cereals (except whole grain under list 3)
   - Breakfast brownies
   - Cornflakes
   - Cream of wheat
   - Farina
   - Grits
   - Post Toasties
   - Puffed rice
   - Rice flakes
   - Rice krispies
   - White cornmeal
   - Yellow cornmeal
6. Miscellaneous cereal products
   - Arrowroot
   - Hominy
   - Macaroni
   - Noodles
   - Sago
   - Spaghetti
   - Tapioca
   - Vermicelli
7. Cheese of all kinds *
8. Eggs
9. Fats of all kinds (but eat in moderation) *
10. Fruits of all kinds
11. Gelatin
12. Milk
    - Buttermilk
    - Condensed milk
    - Malted milk
13. Nuts of all kinds *
    - Peanut butter *
14. Pies (except mincemeat)
15. Shad roe
16. Sugar and sweets
17. Vegetables
    - Artichokes
    - Beets
    - Beet greens
    - Broccoli
    - Brussels sprouts
    - Cabbage
    - Carrots
    - Celery
    - Corn
    - Cucumber
    - Dandelion greens
    - Eggplant
    - Endive
    - Kohlrabi
    - Summer squash
    - Swiss chard
    - Tomato
    - Turnips
      - Sweet
      - White
    - Pumpkin
    - Rutabagas
    - Sauerkraut
    - String beans
    - Lettuce
    - Okra
    - Parsnips
    - Potato
18. Vegetable and cream soups (to be made with allowed vegetables and without meat stock)
19. Vitamin concentrates
    - Cod liver oil
    - Halibut oil
    - Yeast

* These foods are high in fat.

TABLE 23. SODIUM [1]

FOODS HIGHEST IN SODIUM

Biscuits	Cheese	Lima beans, dried	Pepper, black
Bread	Clams	Meat extract	Raisins
Butter	Crackers	Olives	Spinach
Carrots	Egg white	Oysters	Watercress
Caviar	Endive	Paprika	Wheat bran
			Wheat germ

All brined, corned, pickled, smoked, and salted foods.

FOODS LOWEST IN SODIUM

Cereals	Fruit juices	Lettuce	Parsnips
Chocolate	Fruits	Macaroni	Potatoes
Cream	Honey	Maple syrup	Squash
Flour	Kidney beans	Meat	Tomatoes
		Molasses	Wheat gluten

TABLE 24. SODIUM CHLORIDE [2]

(Estimated in milligrams per 100 grams of fresh, edible substance)

FOOD ITEMS	NaCl	FOOD ITEMS	NaCl	FOOD ITEMS	NaCl
Almonds	61	Cheese, full-cream	1,668	Milk, whole	175
American cheese	1,452	Cherries, sweet	23	Molasses	523
Apples, fresh	8	Chicken, roast	165	Oatmeal, raw	114
Apricots, fresh	3	Cocoa, dry	84	Onions	35
Asparagus, fresh	64	Cod, fried	239	Parsnips	50
Bacon, raw	63	Corn, canned	26	Peaches	6
Bananas	206	Cornmeal, yellow	241	Peanuts	92
Beans, lima, fresh	15	Cream, medium	132	Pears, fresh	18
Beans, string or snap	40	Dandelion greens	163	Peas, fresh	40
Beets	96	Egg, whole	175	Pineapple, fresh	84
Blueberries	13	Egg-white	256	Potatoes, white, raw	63
Bread, rye	1,691	Egg-yolk	155	Pumpkin	59
Bread, white	582	Eggplant	40	Raisins, seeded	135
Bread, white, salt-free	191	Figs, dried	71	Raspberries	36
Bread, whole wheat	628	Figs, fresh	23	Rhubarb, fresh	59
Brussels sprouts	66	Flour, white	122	Rice, polished, raw	89
Butter	2,000	Grape juice, Concord	3	Salmon, steamed	105
Butter, salt-free	267	Grapes, American type	8	Salmon, canned	1,425
Buttermilk	163	Grapefruit	8	Shad	158
Cabbage, white, fresh	40	Haddock, filet	257	Shredded Wheat	90
Cantaloupe	68	Halibut, steamed	132	Spinach, fresh	122
Carrots	59	Ham, average, boiled	5,520	Squash	10
Cauliflower	83	Honey	48	Strawberries	10
Celery	257	Lemon juice	5	Sweet potatoes, raw	155
Cheese, cream	312	Lettuce	122	Tomato, raw	56
Cheese, English cream	249	Liver, calf, fried	198	Turnips	68
		Macaroni, raw	120	Walnuts, English	66
		Mackerel, fried	188	Watermelon	13

[1] Bridges, *op. cit.*

[2] Bridges, *op. cit.*, and Frances Stern, *Applied Dietetics*, 2nd ed., Baltimore: The Williams & Wilkins Company, 1943.

TABLE 25. SULPHUR [1]

FOODS HIGHEST IN SULPHUR

Bacon	Cheese	Meats
Beans, dried	Clams	Mustard, dry
Bran	Cocoa	Nuts
Bread	Crackers	Onions
Brussels sprouts	Eggs	Oysters
Cabbage greens	Fish	Peas
Cauliflower	Horse-radish	Swiss chard
Cereals	Macaroni	Watercress

FOODS LOWEST IN SULPHUR

Butter	Root vegetables, except rutabagas	Starches
Fruit juices	Salad vegetables, except cabbage, onions, and watercress	Sugars
Fruits		Syrups
Rhubarb		Vegetable juices

TABLE 26. WATER [1]

FOODS HIGHEST IN WATER

FOODS CONTAINING OVER 70 PER CENT WATER

Asparagus	Eggs	Shellfish
Beef juice	Fruit juices	Soups
Berries	Fruits, fresh	Squash
Buttermilk	Gruels	String beans
Calves' foot jelly	Leafy vegetables	Tomatoes
Cauliflower	Milk	Veal
Corn, cooked	Sauerkraut	Vegetable juices
Cream		

FOODS LOWEST IN WATER

FOODS CONTAINING LESS THAN 30 PER CENT WATER

Butter	Crackers, biscuits	Pretzels
Cakes, crackers	Dried fruits	Smoked bacon
Candy	Nuts	Suet
Cereals, ready-to-eat	Popcorn	Syrups
Coconut	Potato chips	Zwieback

[1] Bridges, *op. cit.*

TABLE 27. NORMAL CONSTITUENTS AND VARIATIONS FROM THE NORMAL CONSTITUENTS OF THE DIET (ADULT)[1]

CALORIES:

35 to 100 calories per kilogram per 24 hours depending upon age, or the height in inches times 40 calories per inch.
Increased in malnutrition, end of pregnancy, fevers, when metabolic rate is elevated.
Decreased in obesity, diabetes, hypertension, gout, arthritis, hypothyroidism.

PROTEIN:

1 gm. per kilogram for adult—10 to 15% of total calories, 2 to 3 gm. per kilogram for growing child.
Increased in pregnancy, lactation, recovery from illness, malnutrition, when albuminuria is present and when serum proteins are low (nephrosis), in colitis, liver disease, typhoid, gastro-intestinal tract disturbances, especially peptic ulcer and ulcerative colitis.
Decreased in acute nephritis and uremia, moderate intake (as with all food) in cardiac disease or hypertension. In gout the diet should be purine free, therefore restriction of certain proteins (nucleoproteins).

FAT:

1 to 2 gm. per kilogram of body weight, 25 to 45% of total calories, a total of 75 to 150 gm.
Increased in diabetes, hypoglycemia, epilepsy, malnutrition, constipation, tuberculosis, urinary tract infections, and in most high caloric diets.
Decreased in certain liver disturbances, celiac disease, steatorrhea, pancreatitis, anemia, decreased gastric motility.

CARBOHYDRATE:

4 to 5 gm. per kilogram of body weight, 40 to 50% of the total calories. A total of 300 to 400 gm.
Increased in liver and gall bladder disease, cardiac disease, acute nephritis and uremia, all fevers except tuberculosis, nausea and vomiting, high caloric diets, to overcome intestinal putrefaction.
Decreased in diabetes, hypoglycemia, epilepsy or in the ketogenic diet, in tuberculosis.

VITAMINS[2]

A—5,000 to 8,000 I.U. daily.
B_1—400 to 700 I.U. daily, 1.2 to 2.3 mg.
B_2—900 to 1,300 S.B. units daily, 2.2 to 3.3 mg.
Nicotinic acid 15 to 25 mg. daily.

[1] E. E. Hawley and G. Cardon, *The Art and Science of Nutrition*, 2nd ed., St. Louis: The C. V. Mosby Co., 1944.
[2] See pages 41-42.

C—70 to 100 mg., 1,000 to 2,000 I.U. daily.
D—400 to 1,000 I.U.
E, K and other members of the B complex—requirement unknown.
Specific vitamin therapy in the deficiency or subclinical conditions due to their lack.
Increased general vitamin therapy in pregnancy, lactation, fevers or other conditions of metabolic increase, gastrointestinal disorders or lesions.

MINERALS:

Ca 0.8 to 2 gm. P 1 to 1½ gm. Fe 12 to 15 mg.
Increased in pregnancy and lactation, growth, and anemia.
Alteration in intake of Na and K in Addison's disease.
Decrease in K, increase in Na, restriction of NaCl from usual 10 to 20 gm. to maintenance level of 2 to 3 gm. in edema. Acid-base balance shift to combat urolithiasis or urinary tract infection.

WATER:

1 to 2 liters daily.
Increased in fevers, certain kidney disorders, dehydration, Addison's disease, constipation.
Decreased in edema, renal insufficiency, epilepsy.

ROUGHAGE:

Increased in atonic constipation and obesity.
Decreased to produce smooth or soft diet, for gastro-intestinal lesions, spastic constipation, malnutrition, high caloric diets.

FA:G:

Normal ratio 0.8:1, diabetes 1:1, borderline 1.5:1, ketogenic level 3:1.

ACID-BASE BALANCE:

The normal diet is neutral or somewhat alkaline.
The *acidic* diet is used to facilitate the solution of phosphates while the basic or *alkaline ash* diet is effective when urates, oxalates, or cystine tend to precipitate. Adjustments may also be of value in combating infections.

Table 28. Summary of Adjustments of the Normal Diet to Meet Therapeutic Needs.[1]

1	2	3	4	5	6	7	8
NORMAL DIET	LOW SALT* NO SALT ADDED TO FOOD	LOW PURINE	SMOOTH**	BULKY	DIABETIC	ANEMIA	HIGH PROTEIN AND VITAMIN, LOW CARBOHYDRATE AND FAT
BREAKFAST Fruit	Fruit	Fruit	Fruit pulp or fruit juices	Fruit with pulp or skin	Fruit without sugar	Fruit, especially prunes and apricots	Fruit
Whole grain cereal with sugar and cream or milk	Cereal	Cereal, refined or enriched	Fine or strained cereal	Coarse cereal	Cereal	Cereal	Dry cereal (with banana)
Egg and /or bacon†	Egg†	Egg†	Egg†	Egg and /or bacon†	Egg†	Egg†	
Toast or muffins (enriched)	Toast or muffins (enriched)	Toast or muffins (enriched)	Toast or muffins (enriched)	Whole grain toast or muffin	1 slice toast (enriched)	Whole grain toast or muffins	Thin slice toast
Butter	"Fresh" butter	Butter	Butter	Butter	Butter	Butter	
Marmalade or jam	Marmalade or jam	Marmalade or jam	Jelly	Marmalade or jam			
Coffee† with milk or cream and sugar	Coffee† with milk or cream and sugar	Coffee† with milk or cream and sugar	Coffee† with milk or cream and sugar	Coffee† with milk or cream and sugar	Coffee† (with milk or cream)	Coffee† with milk or cream and sugar	Skim milk
LUNCHEON Soup	Cream soup	Cream soup	Cream soup	Soup	Clear soup†	Soup	"Cream" soup (skim milk base)
Entree and /or salad Salad dressing	Entree and /or salad without salt Salad dressing	Entree and or salad without meat or fish Salad dressing	Egg, cheese, rice, or Italian paste entree	Entree and salad Salad dressing	Egg, meat, fish, cheese and salad Salad dressing	Entree and salad Salad dressing	Lean meat, fish, or ct. cheese and /or salad, cooked dressing
Bread or rolls† (whole grain or enriched)	Bread or rolls†	Bread or rolls† (enriched)	White bread† (enriched)	Whole grain bread†	Bread	Whole wheat bread†	Thin slice toast

[1]Hawley and Carden, *op. cit.*

LUNCHEON—Cont. Butter†	"Fresh" butter†	Butter†	Butter†	Butter†	Butter	Butter†	
Milk	Milk	Milk	Milk	Milk	Milk as indicated	Milk	Skim milk
Tea†	Tea†	Tea†	Tea†	Tea†	Tea†	Tea†	Tea†
Dessert	Dessert	Dessert	"Smooth" dessert	Dessert with fruit	Fruit without sugar	Dessert	Fruit or fruit whip
DINNER Meat or fish	Meat or fish *neither salted nor smoked*	Eggs or cheese	Tender meat or fish	Meat or fish	Meat, egg, fish, or cheese	Meat or fish, especially liver, kidney, or oysters	Tender meat, light colored fish, or poultry
Potato	Potato	Potato	Potato (except fried)	Potato with skin	1 small potato or bread	Potato	
Vegetable (cooked)	Vegetable (cooked)	Vegetable (cooked)	"Smooth" vegetable	Vegetable (cooked)	Vegetable (cooked)	Green vegetable (cooked)	Green vegetable (cooked)
Vegetable (raw)	Vegetable (raw)	Vegetable (raw)	Tender lettuce or cabbage shredded, or gelatin salad	Vegetable (raw)	Vegetable (raw)	Green vegetable (raw)	Green vegetable (raw)
Bread†	Bread†	Bread†	Bread†	Bread†		Whole wheat bread†	Thin slice toast
Butter†	"Fresh" butter†	Butter†	Butter†	Butter†	Butter	Butter†	
Dessert	Dessert	Dessert	"Smooth" dessert	Cereal pudding or dessert with fruit	Fruit without sugar	Fruit dessert, especially prunes, apricots, peaches or strawberries	Gelatin dessert
Coffee† with milk or cream and sugar	Coffee† with milk or cream and sugar	Coffee† with milk or cream and sugar	Coffee† with milk or cream and sugar	Coffee† with milk or cream and sugar	Coffee (with milk or cream)	Coffee† with milk or cream and sugar	Clear coffee†
Milk	Milk	Milk	Milk	Milk	Milk as indicated		Skim milk
USE OF DIET	Renal insufficiency, edema	Gout or some types of arthritis	Ulcers, spastic colon, colitis	Atonic constipation	Diabetes	Anemia	Celiac disease, steatorrhea

*Salt content of diet may be further reduced by the omission of all added salt in preparation of foods.
†If desired.
**Meat grinder and strainer essential in reducing undigestible residue. "Smooth" diet may be made bland by limitation of seasoning and highly flavored foods.

Table 28. Summary of Adjustments of the Normal Diet to Meet Therapeutic Needs (Continued)

1	2	3	4	5	6	7	8
NORMAL DIET	LOW CALORIES	HIGH CALORIES	HIGH PROTEIN	LOW PROTEIN	HIGH CALCIUM, HIGH VITAMIN	HIGH FAT, LOW WATER, LOW CARBOHYDRATE	LOW FAT, HIGH CARBOHYDRATE AND PROTEIN
BREAKFAST Fruit	Fresh fruit	Sweet fruit	Fruit	Fruit	Fruit	Fruit without sugar	Fruit
Whole grain cereal with sugar and cream or milk		Cereal with sugar and cream	Cereal with sugar and milk	Cereal with sugar and cream	Cereal with sugar and milk or cream		Cereal with sugar and skim milk
Egg and /or bacon†	Egg	Egg and /or bacon	2 eggs		Egg	2 eggs with butter	
Toast or muffins	1 slice toast	2 thin slices toast	1 slice toast or muffin	Toast		Gluten or soybean toast	Toast or muffin
Butter	1 pat butter	2 pats butter	Butter	Butter	Butter	Butter	
Marmalade or jam		Marmalade or jam	Marmalade or jam	Marmalade or jam	Marmalade or jam		Marmalade or jam
Coffee† with milk or cream and sugar	Coffee† without cream or sugar	Coffee† with cream and sugar	Coffee† with milk and sugar	Coffee† with cream and sugar	Coffee† with milk and sugar		Coffee† with skim milk and sugar
LUNCHEON Soup	Clear soup	Cream soup	Cream soup	Clear soup	Cream soup		Clear soup with crackers
Entree and /or salad Salad dressing	Meat or fish entree and /or salad with little or no dressing	Entree and salad Salad dressing	Meat or fish entree or salad Salad dressing	Entree and /or salad without meat, fish, eggs, or cheese Salad dressing	Entree and salad Salad dressing	Meat or fish entree and /or salad with much salad dressing	Starchy or protein entree
Bread or rolls† (whole grain or enriched)	1 slice bread or 1 roll†	Bread or rolls	Bread or rolls†	Bread or rolls†	Bread or rolls†	Gluten or soybean bread†	Bread or rolls
Butter†	1 pat butter	Butter	Butter†	Butter†	Butter	Butter or peanut butter†	Jam

Table 28. Summary of Adjustments of the Normal Diet to Meet Therapeutic Needs (Continued)

LUNCHEON—Cont. Milk	Skim milk	Milk	Milk		Milk		Skim milk
Tea†	Tea†	Tea†	Tea†	Tea†	Tea†		Tea†
Dessert	Fruit	Dessert	Egg or milk dessert	Fruit	Fruit or milk dessert	Diabetic gelatin made with cream	Fruit or cereal dessert without cream
DINNER Meat or fish	Meat or fish	Meat or fish	Meat or fish	Meat or fish—small serving	Meat or fish	Meat	Lean meat or fish
Potato	1 very small potato†	Potato	Potato	Potato	Potato		Potato
Vegetable (cooked)	Vegetable (cooked)	Vegetable (cooked)	Vegetables (cooked and / or raw)	Vegetable (cooked)	Vegetable (cooked)	Vegetable (cooked)	Vegetable (cooked)
Vegetable (raw)	Vegetable (raw)	Vegetable (raw)	Cheese salad	Vegetable (raw)	Vegetable (raw)	Vegetable (raw) with oil dressing	Vegetable (raw)
Bread†		Bread	Bread†	Bread†	Bread†	Gluten or soybean bread†	Bread
Butter†		Butter	Butter†	Butter†	Butter†	Butter	1 pat butter
Dessert	Fruit or gelatin	Milk, egg or cereal dessert	Milk, egg or gelatin dessert	Fruit dessert	Fruit dessert	Custard made with egg yolk and cream	Cereal or fruit dessert
Coffee† with cream or milk and sugar	Clear coffee†	Milk‡	Milk with all meals	Coffee† with cream and sugar	Milk with all meals		Coffee† with milk and sugar
USE OF DIET	Reduction, hypertension, hypothyroidism.	Any undernourished state Hyperthyroidism	Albuminuria, recovery from a wasting disease. Toxemias of pregnancy	Uremia, acute nephritis	Lead fixation, rheumatic fever, pregnancy and lactation, fractures, tuberculosis	Epilepsy, urinary infections, sedation	Liver and gall bladder diseases

†If desired.
‡Extra nourishment, as milk, chocolate, malted or fruit drinks, midmorning, midafternoon, and at bedtime.

TABLE 29. NORMAL AND ABNORMAL PHYSIOLOGICAL VALUES IN THE HUMAN BODY [1]

	NORMAL RANGE	PATHOLOGICAL MANIFESTATIONS
Blood		
Blood pressure—mm. Hg.	male—110-135 female—105-130	hypotension—80-100 hypertension—115-300
Red cell count per c. mm.	male—5,000,000 female—4,500,000 child—4,500,000	anemias—less than 4,000,000 polycythemia—6-8,000,000
White cell count per c. mm.	adults—7,500 child—9,000	leucopenia—less than 6,000 leucocytosis—more than 10,000
Hemoglobin—Gm. per 100 cc.	male—14-18 female—12-16	anemias—7-12
Reaction (pH)	7.35-7.45	uncompensated acidosis 7.1-7.3 uncompensated alkalosis—7.5-7.8
Co_2 combining power vol. %	45-60	severe acidosis—below 30
Sugar—mg. per 100 cc.	90-110	hyperglycemia—more than 40
Non-protein N.—mg. per 100 cc.	25-40	mild retention—35-50 severe retention—50-400
Urea N.—mg. per 100 cc.	10-15	mild retention—30-40 severe retention—more than 40
Creatinine—mg. per 100 cc.	1-1.6	mild retention—2-4 severe retention—4-35
Uric acid—mg. per 100 cc.	1-3.5	mild retention—3-10 severe retention—more than 20
Urine		
Specific gravity	1.010-1.025	polyuria—1.010 or less concentrated—1.03 or more
Reaction (pH)	4.8-8.0 av. 6.0	acidosis—less than 4.0 alkalosis—more than 8.0
Urea—Gm. per 24 hrs.	10-40	
Creatinine—Gm. per 24 hours.	1.0-1.5	

[1] L. F. Cooper, E. M. Barber, and H. S. Mitchell, *Nutrition in Health and Disease,* 9th ed., Philadelphia: J. B. Lippincott Co., 1941.

TABLE 29. NORMAL AND ABNORMAL PHYSIOLOGICAL VALUES IN THE HUMAN BODY—(Continued)

	NORMAL RANGE	PATHOLOGICAL MANIFESTATIONS
Gastric Acidity per cent HCl	0.2-0.4	achlorhydria—no acid hyperchlorhydria—more than 0.4
Basal Metabolic Rate (B.M.R.)	approximately 1 cal. per kilo. per hr. 1,200-1,700 cal. per 24 hrs., plus or minus 10%	Low B.M.R.—minus 10-40% High B.M.R.—plus 10-60% (calculated by comparing with accurate tables)

TABLE 30. WEIGHT AND HEIGHT OF BOYS AND GIRLS FROM TWO TO SIX YEARS [1]

AGE YEARS	MONTHS	NO. CASES	WEIGHT (MEAN) POUNDS	WEIGHT (MEAN) OUNCES	NO. CASES	HEIGHT-INCHES STANDING (MEAN)
BOYS						
2	0	105	28	1	46	34.2
2	6	107	30	5	58	36.0
3	0	101	32	6	77	37.3
3	6	96	34	4	90	38.8
4	0	88	36	10	85	40.4
4	6	89	38	7	92	41.7
5	0	88	40	14	87	42.8
5	6	80	43	7	80	44.3
GIRLS						
2	0	106	27	5	49	33.8
2	6	103	30	0	61	35.7
3	0	103	32	1	79	37.2
3	6	100	34	8	85	38.7
4	0	93	36	13	90	39.8
4	6	91	39	2	91	41.2
5	0	88	41	5	88	42.5
5	6	81	43	6	78	43.9

[1] Arranged from values given by V. S. Vickers and H. C. Stuart in *Journal of Pediatrics,* 22 (February 1943), 155. Values presented are considered more nearly to approximate what should be taken as desirable in children up to 6 years than are the values presented in Tables 32 and 33—personal communication of one of the authors(S).

TABLE 31. MEAN STATURE AND WEIGHT OF BOYS AND GIRLS AT AGES 6 TO 17 YEARS [1]

MALES

AGE (YRS.)	NUMBER OF CASES	MEAN STATURE (INCHES)	NUMBER OF CASES	WEIGHT (MEAN) LBS.	OZ.
6	374	45.6	379	46	3
7	575	48.0	598	51	14
8	493	50.4	529	58	1
9	478	52.6	482	63	14
10	390	54.7	390	71	11
11	368	56.4	368	77	13
12	340	58.2	340	85	4
13	345	60.4	345	96	3
14	345	62.8	345	107	3
15	376	65.0	376	121	2
16	343	66.8	337	128	11
17	288	68.3	284	137	10

FEMALES

AGE (YRS.)	NUMBER OF CASES	MEAN STATURE (INCHES)	NUMBER OF CASES	WEIGHT (MEAN) LBS.	OZ.
6	184	45.3	184	45	5
7	219	47.6	219	50	8
8	193	49.9	194	56	9
9	204	52.2	204	62	12
10	214	54.2	214	69	12
11	203	56.5	202	79	0
12	204	59.2	204	89	12
13	183	61.4	184	100	6
14	188	62.8	188	110	15
15	206	63.3	206	118	3
16	183	63.5	183	119	12
17	166	63.5	166	120	0

[1] Adapted from tables published in monographs by Meredith, on males, and by Boyton, on females: Howard V. Meredith, 1935, "The Rhythm of Physical Growth," *University of Iowa Studies in Child Welfare,* XI, No. 3, p. 128; Bernice Boyton, 1936, "The Physical Growth of Girls," *Ibid.,* XII, No. 4, p. 105.

Stature measured without shoes and with the subjects in the erect position. Weight taken nude.

The subjects were Iowa City residents examined over the years 1920-1935. They were almost entirely of northwest European ancestry. Over 50 per cent were drawn from the professional and managerial classes and another 40 per cent from the skilled and semi-skilled groups.

Table 32. Weight—Height—Age Table for Boys of School Age:[1]

Height (In.)	Average Weight for Height (Lbs.)	5 Years	6 Years	7 Years	8 Years	9 Years	10 Years	11 Years	12 Years	13 Years	14 Years	15 Years	16 Years	17 Years	18 Years	19 Years	Height (In.)
38	34	34	34*														38
39	35	35	35														39
40	36	36	36*														40
41	38	38	38	38*													41
42	39	39	39	39*	39*												42
43	41	41	41	41*	41*												43
44	44	44	44	44	44*												44
45	46	46	46	46	46*	46*											45
46	48	47*	48	48	48	48*											46
47	50	49*	50	50	50	50*	50*										47
48	53		52	53	53	53	53*										48
49	55		55	55	55	55	55	55*									49
50	58		57*	58	58	58	58	58*	58*								50
51	61			63	61	61	61	61	61*								51
52	64			64	64	64	64	64	64	64*							52
53	68			66*	67	67	67	67	68	68*							53
54	71				70	70	70	70	71	71	72*						54
55	74				72*	72	73	73	74	74	74*						55
56	78				75*	76	77	77	77	78	78	80*					56
57	82					79*	80	81	81	82	83	83*					57
58	85					83*	84	84	85	85	86	87					58
59	89						87	88	89	89	90	90	90				59
60	94						91*	92	92	93	94	95	96				60
61	99							95	96	97	99	100	103	106*			61
62	104							100*	101	102	103	104	107	111	116*		62
63	111							105*	106	107	108	110	113	118	123	127*	63
64	117								109	111	113	115	117	121	126	130*	64

[1]See footnote following page.

Table 32. Weight—Height—Age Table for Boys of School Age: (Continued)

Height (In.)	Average Weight for Height (Lbs.)	5 Years	6 Years	7 Years	8 Years	9 Years	10 Years	11 Years	12 Years	13 Years	14 Years	15 Years	16 Years	17 Years	18 Years	19 Years	Height (In.)
65	123								114*	117	118	120	122	127	131	134	65
66	129									119	122	125	128	132	136	139	66
67	133									124*	128	130	134	136	139	142	67
68	139										134	134	137	141	143	147	68
69	144										137	139	143	146	149	152	69
70	147										143	144	145	148	151	155	70
71	152										148*	150	151	152	154	159	71
72	157											153	155	156	158	163	72
73	163											157*	160	162	164	167	73
74	169											160*	164	168	170	171	74

Age—Year		6	7	8	9	10	11	12	13	14	15	16	17	18	19
Average Height (inches)	Short	43	45	47	49	51	53	54	56	58	60	62	64	65	65
	Medium	46	48	50	52	54	56	58	60	63	65	67	68	69	69
	Tall	49	51	53	55	57	59	61	64	67	70	72	72	73	73
Average Annual Gain (lbs.)	Short	3	4	5	5	5	4	8	9	11	14	13	7	3	
	Medium	4	5	6	6	6	7	9	11	15	11	8	4	3	
	Tall	5	7	7	7	7	8	12	16	11	9	7	3	4	

The tables are to be used as follows:

Take, for example, a 14-year-old boy who is 64 inches tall. By following the numbers horizontally opposite the figure 64 it will be found that he should weigh 113 pounds. A 12-year-old boy who is 64 inches tall should weigh 109 pounds and an 18-year-old boy should weigh 126 pounds.

Age is taken at the nearest birthday, height at the nearest inch, and weight at the nearest pound. A child is considered 6 years old at any time between 5½ and 6½ years.

The figures not starred represent exact averages in round numbers.

The starred (*) figures represent smoothed or interpolated values.

The following percentage of net weight has been added for clothing—shoes, coats and sweaters not included:

36 to 63 pounds.................... 3.5%   64 pounds and over................ 4.0%

[1]Prepared by Bird T. Baldwin, Ph.D., Iowa Child Welfare Research Station, State University of Iowa, and Thomas D. Wood, M.D., Columbia University, New York City. Courtesy of The American Red Cross, "Food and Nutrition." P. Blakiston's Son & Co., Philadelphia, Pa.

Table 33. Weight—Height—Age Table for Girls of School Age:[1]

Height (In.)	Average Weight for Height (Lbs.)	5 Years	6 Years	7 Years	8 Years	9 Years	10 Years	11 Years	12 Years	13 Years	14 Years	15 Years	16 Years	17 Years	18 Years	Height (In.)
38	33	33	33													38
39	34	34	34													39
40	36	36	36	36*												40
41	37	37	37	37*												41
42	39	39	39	39*												42
43	41	41	41	41	41*											43
44	42	42	42	42	42*											44
45	45	45	45	45	45	45*										45
46	47	47*	47	47	48	48*										46
47	50	49*	50	50	50	50	50									47
48	52		52	52	52	52	53*	53*								48
49	55		54	54	55	55	56	56*								49
50	58		56*	56	57	58	59	61	62*							50
51	61			59	60	61	61	63	65							51
52	64			63*	64	64	64	65	67							52
53	68			66*	67	67	68	68	69	71*						53
54	71				69	70	70	71	71	73*						54
55	75				72*	74	74	74	75	77	78*					55
56	79					76	78	78	79	81	83*					56
57	84					80*	82	82	82	84	88	92*				57
58	89						84	86	86	88	93	96*	101*			58
59	95						87	90	90	92	96	100	103*	104*		59
60	101						91*	95	95	97	101	105	108	109	111*	60
61	108							99	100	101	105	108	112	113	116	61
62	114							104*	105	106	109	113	115	117	118	62
63	118								110	110	112	116	117	119	120	63
64	121								114*	115	117	119	120	122	123	64

[1]See footnote following page.

Table 33. Weight—Height—Age Table for Girls of School Age: (Continued)

Height (In.)	Average Weight for Height (Lbs.)	5 Years	6 Years	7 Years	8 Years	9 Years	10 Years	11 Years	12 Years	13 Years	14 Years	15 Years	16 Years	17 Years	18 Years	Height (In.)
65	125								118*	120	121	122	123	125	126	65
66	126									124	124	125	128	129	130	66
67	133									128*	130	131	133	133	135	67
68	138									131*	133	135	136	138	138	68
69	142										135*	137*	138*	140*	142*	69
70	144										136*	138*	140*	142*	144*	70
71	145										138*	140*	142*	144*	145*	71

Age—Year		6	7	8	9	10	11	12	13	14	15	16	17	18
Average Height (inches)	Short	43	45	47	49	50	52	54	57	59	60	61	61	61
	Medium	45	47	50	52	54	56	58	60	62	63	64	64	64
	Tall	47	50	53	55	57	59	62	64	66	66	67	67	67
Average Annual Gain (lbs.)	Short	4	4	4	5	6	6	10	13	10	7	2	1	
	Medium	5	5	6	7	8	10	13	10	6	4	3	1	
	Tall	6	8	8	9	11	13	9	8	4	4	1	1	

The following percentage of net weight has been added for clothing—shoes and sweaters not included:

35 to 65 pounds 3.0%
66 to 82 pounds 2.5%
83 pounds and over 2.0%

See also notes on following table.

[1]Prepared by Bird T. Baldwin, Ph.D., Iowa Child Welfare Research Station, State University of Iowa, and Thomas D. Wood, M.D., Columbia University, New York City. Courtesy of The American Red Cross, "Food and Nutrition." P. Blakiston's Son & Co., Philadelphia, Pa.

Table 34. Standard Weight for Men

Age	5 ft.	5 ft. 1 in.	5 ft. 2 in.	5 ft. 3 in.	5 ft. 4 in.	5 ft. 5 in.	5 ft. 6 in.	5 ft. 7 in.	5 ft. 8 in.	5 ft. 9 in.	5 ft. 10 in.	5 ft. 11 in.	6 ft.	6 ft. 1 in.	6 ft. 2 in.	6 ft. 3 in.	6 ft. 4 in.	6 ft. 5 in.
16..	109	111	114	117	120	124	128	132	136	140	144	149	154	159	164	169	174	179
17..	111	113	116	119	122	126	130	134	138	142	146	151	156	161	166	171	176	181
18..	113	115	118	121	124	128	132	136	140	144	148	153	158	163	168	173	178	183
19..	115	117	120	123	126	130	134	138	142	146	150	155	160	165	170	175	180	185
20..	117	119	122	125	128	132	136	140	144	148	152	156	161	166	171	176	181	186
21..	118	120	123	126	130	134	138	141	145	149	153	157	162	167	172	177	182	187
22..	119	121	124	127	131	135	139	142	146	150	154	158	163	168	173	178	183	188
23..	120	122	125	128	132	136	140	143	147	151	155	159	164	169	175	180	185	190
24..	121	123	126	129	133	137	141	144	148	152	156	160	165	171	177	182	187	192
25..	122	124	126	129	133	137	141	145	149	153	157	162	167	173	179	184	189	194
26..	123	125	127	130	134	138	142	146	150	154	158	163	168	174	180	186	191	196
27..	124	126	128	131	134	138	142	146	150	154	158	163	169	175	181	187	192	197
28..	125	127	129	132	135	139	143	147	151	155	159	164	170	176	182	188	193	198
29..	126	128	130	133	136	140	144	148	152	156	160	165	171	177	183	189	194	199
30..	126	128	130	133	136	140	144	148	152	156	161	166	172	178	184	190	196	201
31..	127	129	131	134	137	141	145	149	153	157	162	167	173	179	185	191	197	202
32..	127	129	131	134	137	141	145	149	154	158	163	168	174	180	186	192	198	203
33..	127	129	131	134	137	141	145	149	154	159	164	169	175	181	187	193	199	204
34..	128	130	132	135	138	142	146	150	155	160	165	170	176	182	188	194	200	206
35..	128	130	132	135	138	142	146	150	155	160	165	170	176	182	189	195	201	207
36..	129	131	133	136	139	143	147	151	156	161	166	171	177	183	190	196	202	208
37..	129	131	133	136	140	144	148	152	157	162	167	172	178	184	191	197	203	209
38..	130	132	134	137	140	144	148	152	157	162	167	173	179	185	192	198	204	210
39..	130	132	134	137	140	144	148	152	157	162	167	173	179	185	192	199	205	211
40..	131	133	135	138	141	145	149	153	158	163	168	174	180	186	193	200	206	212
41..	131	133	135	138	141	145	149	153	158	163	168	174	180	186	193	200	207	213
42..	132	134	136	139	142	146	150	154	159	164	169	175	181	187	194	201	208	214
43..	132	134	136	139	142	146	150	154	159	164	169	175	181	187	191	201	208	214
44..	133	135	137	140	143	147	151	155	160	165	170	176	182	188	195	202	209	215
45..	133	135	137	140	143	147	151	155	160	165	170	176	182	188	195	202	209	215
46..	134	136	138	141	144	148	152	156	161	166	171	177	183	189	196	203	210	216
47..	134	136	138	141	144	148	152	156	161	166	171	177	183	190	197	204	211	217
48..	134	136	138	141	144	148	152	156	161	166	171	177	183	190	197	204	211	217
49..	134	136	138	141	144	148	152	156	161	166	171	177	183	190	197	204	211	217
50..	134	136	138	141	144	148	152	156	161	166	171	177	183	190	197	204	211	217
51..	135	137	139	142	145	149	153	157	162	167	172	178	184	191	198	205	212	218
52..	135	137	139	142	145	149	153	157	162	167	172	178	184	191	198	205	212	218
53..	135	137	139	142	145	149	153	157	162	167	172	178	184	191	198	205	212	218
54..	135	137	139	142	145	149	153	158	163	168	173	178	184	191	198	205	212	219
55 & up..	135	137	139	142	145	149	153	158	163	168	173	178	184	191	198	205	212	219

From *Periodic Health Examination*, 2nd edition.

Table 35. Standard Weight for Women

ge	4 ft. 8 in.	4 ft. 9 in.	4 ft. 10 in.	4 ft. 11 in.	5 ft.	5 ft. 1 in.	5 ft. 2 in.	5 ft. 3 in.	5 ft. 4 in.	5 ft. 5 in.	5 ft. 6 in.	5 ft. 7 in.	5 ft. 8 in.	5 ft. 9 in.	5 ft. 10 in.	5 ft. 11 in.	6 ft.
6......	102	104	106	108	109	111	114	117	120	124	128	132	136	139	143	148	153
7......	103	105	107	109	111	113	116	119	122	125	129	133	137	140	144	149	154
8......	104	106	108	110	112	114	117	120	123	126	130	134	138	141	145	150	155
9......	105	107	109	111	113	115	118	121	124	127	131	135	139	142	146	151	155
0......	106	108	110	112	114	116	119	122	125	128	132	136	140	143	147	151	156
1......	107	109	111	113	115	117	120	123	126	129	133	137	141	144	148	152	156
2......	107	109	111	113	115	117	120	123	126	129	133	137	141	145	149	153	157
3......	108	110	112	114	116	118	121	124	127	130	134	138	142	146	150	153	157
4......	109	111	113	115	117	119	121	124	127	130	134	138	142	146	150	154	158
5......	109	111	113	115	117	119	121	124	128	131	135	139	143	147	151	154	158
6......	110	112	114	116	118	120	122	125	128	131	135	139	143	147	151	155	159
7......	110	112	114	116	118	120	122	125	129	132	136	140	144	148	152	155	159
8......	111	113	115	117	119	121	123	126	130	133	137	141	145	149	153	156	160
9......	111	113	115	117	119	121	123	126	130	133	137	141	145	149	153	156	160
0......	112	114	116	118	120	122	124	127	131	134	138	142	146	150	154	157	161
1......	113	115	117	119	121	123	125	128	132	135	139	143	147	151	154	157	161
2......	113	115	117	119	121	123	125	128	132	136	140	144	148	152	155	158	162
3......	114	116	118	120	122	124	126	129	133	137	141	145	149	153	156	159	162
4......	115	117	119	121	123	125	127	130	134	138	142	146	150	154	157	160	163
35......	115	117	119	121	123	125	127	130	134	138	142	146	150	154	157	160	163
36......	116	118	120	122	124	126	128	131	135	139	143	147	151	155	158	161	164
37......	116	118	120	122	124	126	129	132	136	140	144	148	152	156	159	162	165
38......	117	119	121	123	125	127	130	133	137	141	145	149	153	157	160	163	166
39......	118	120	122	124	126	128	131	134	138	142	146	150	154	158	161	164	167
40......	119	121	123	125	127	129	132	135	138	142	146	150	154	158	161	164	167
41......	120	122	124	126	128	130	133	136	139	143	147	151	155	159	162	165	168
42......	120	122	124	126	128	130	133	136	139	143	147	151	155	159	162	166	169
43......	121	123	125	127	129	131	134	137	140	144	148	152	156	160	163	167	170
44......	122	124	126	128	130	132	135	138	141	145	149	153	157	161	164	168	171
45......	122	124	126	128	130	132	135	138	141	145	149	153	157	161	164	168	171
46......	123	125	127	129	131	133	136	139	142	146	150	154	158	162	165	169	172
47......	123	125	127	129	131	133	136	139	142	146	151	155	159	163	166	170	173
48......	124	126	128	130	132	134	137	140	143	147	152	156	160	164	167	171	174
49......	124	126	128	130	132	134	137	140	143	147	152	156	161	165	168	172	175
50......	125	127	129	131	133	135	138	141	144	148	152	156	161	165	169	173	176
51......	125	127	129	131	133	135	138	141	144	148	152	157	162	166	170	174	177
52......	125	127	129	131	133	135	138	141	144	148	152	157	162	166	170	174	177
53......	125	127	129	131	133	135	138	141	144	148	152	157	162	166	170	174	177
54......	125	127	129	131	133	135	138	141	144	148	153	158	163	167	171	174	177
55......	125	127	129	131	133	135	138	141	144	148	153	158	163	167	171	174	177

From *Periodic Health Examination,* 2nd Edition. Copyright, 1940, by American Medical Association.

RECOMMENDED FOR REFERENCE

GENERAL

Alvarez, Walter C. *An Introduction to Gastro-Enterology,* 3d Edition. New York: Paul B. Hoeber, Inc., 1940.

Bogert, L. J. *Nutrition and Physical Fitness,* 4th Edition. Philadelphia: W. B. Saunders Co., 1943.

Bridges, Milton Arlanden. *Dietetics for the Clinician,* 4th Edition. Philadelphia: Lea and Febiger, 1941.

Bureau of Human Nutrition and Home Economics and The National Research Council. Table of Food Composition in Terms of Eleven Nutrients. U.S.D.A. Miscellaneous Publication 572, 1945.

Chaney, M. S., and Ahlborn, M. *Nutrition.* New York: Houghton Mifflin, 1943.

Chatfield, Charlotte, and Adams, Georgian. *Proximate Composition of American Food Materials,* Circular No. 549. Washington: United States Department of Agriculture, 1940.

California Dietetic Association. *Compilation of Diets.* Los Angeles: Institute Press, 1942.

Cooper, L. F., Barber, E. M., and Mitchell, H. S., *Nutrition in Health and Disease,* 6th Edition. Philadelphia: J. B. Lippincott Co., 1941.

Hawley, E. E., and Carden, G. *The Art and Science of Nutrition.* St. Louis: The C. V. Mosby Co., 1941.

Holt's Care and Feeding of Children, revised by L. Emmett Holt, Jr., 16th Edition. New York: D. Appleton-Century Company, 1943.

Joslin, Elliott P. *Joslin's Diabetic Manual,* 7th Edition. New York: The Macmillan Co., 1944.

Murphy, William P. *Anemia in Practice: Pernicious Anemia.* Philadelphia: W. B. Saunders Co., 1939.

McCollum, E. V., and Becker, J. E. *Food, Nutrition and Health,* 5th Edition. Baltimore: E. V. McCollum, 1940.

McLester, James S. *Nutrition and Diet in Health and Disease,* 4th Edition. Philadelphia: W. B. Saunders Co., 1943.

The New York Hospital. *Handbook of Applied Nutrition.* New York: The New York Hospital, 1939.

Pattee, Alida Frances. *Vitamins and Minerals for Everyone*. New York: G. P. Putnam's Sons, 1942.

Pollack, Herbert, Ph.D., M.D. *Modern Diabetic Care*. New York: Harcourt, Brace and Co., 1940.

The Presbyterian Hospital, Nutrition Department. *Manual of Diets*. New York: The Presbyterian Hospital, 1943.

Proudfit, Fairfax T. *Nutrition and Diet Therapy,* 8th Edition. New York: The Macmillan Co., 1942.

MacLeod, Grace, and Taylor, Clara M. *Rose's Foundation of Nutrition,* 4th Edition. New York: The Macmillan Co., 1944.

Rose, Mary Swartz. *Feeding the Family,* 4th Edition. New York: The Macmillan Co., 1940.

Sansum, W. D., Hare, R. A., and Bowden, Ruth. *The Normal Diet and Healthful Living*. New York: The Macmillan Co., 1936.

Selling, Lowell S., M.D., and Ferraro, Mary Anne S., M.S. *The Psychology of Diet and Nutrition*. New York: W. W. Norton and Co., 1945

Sherman, Henry C. *Chemistry of Food and Nutrition,* 6th Edition. New York: The Macmillan Co., 1941.

Stern, F. *Applied Dietetics,* 2d Edition. Baltimore: Williams and Wilkins, 1943.

Taylor, Clara M. *Food Values in Shares and Weights*. New York: The Macmillan Co., 1942.

U. S. War Department. *Hospital Diets,* T M 8-500. Washington, D. C.: U. S. Government Printing Office, 1945.

U. S. DEPARTMENT OF AGRICULTURE PAMPHLETS

Alexander, Lucy M., and Yeatman, Fanny Walker. *Meat for Thrifty Meals*. Farmers' Bulletin No. 1908, 1942.

Alexander, L. M., and Yeatman, F. W. *Eggs at Any Meal*. Leaflet No. 39, 1931.

Alexander, L. M. *Poultry Cooking*. Farmers' Bulletin No. 1888, 1941.

Cooking with Soya Flour and Grits. A W 1-73, 1944.

Davis, W. C. *Commercial Cuts of Meat*. Circular 300, 1941.

Dried Beans and Peas in Wartime Meals. A W 1-47, 1943.

Drown, Marion Julia. *Soybeans and Soybean Products as Food.* Miscellaneous Publication No. 534, 1943.

Egg Dishes for Any Meal. A W 1-89, 1944.

Green Vegetables in Wartime Meals. A W 1-54, 1943.

Potatoes in Popular Ways. A W 1-85, 1944.

Root Vegetables in Wartime Meals. A W 1-39, 1943.

Tomatoes on Your Table. A W 1-104, 1944.

COOKBOOKS

Barber, Edith M. *Edith Barber's Cook Book.* New York: G. P. Putnam's Sons, 1940.

Batchelder, Ann. *Ann Batchelder's Own Cook Book.* New York: M. Barrows, 1941.

Berolzheimer, Ruth, Editor. *American Woman's Cook Book.* Chicago: Consolidated Book Publishers, 1944.

Farmer, Fanny Merrit, 7th Edition revised by Wilma Lord Perkins. *The Boston Cooking-School Cook Book.* Boston: Little Brown Co., 1945.

Fisher, Katharine, and Marsh, Dorothy B., Editors. *The Good Housekeeping Cook Book,* 7th Edition. New York: Farrar and Rinehart, Inc., 1944.

Kirk, Dorothy, Editor. *Woman's Home Companion Cook Book,* 5th Edition. New York: P. F. Collier and Con Corp., 1945.

Lord, Isabel Ely, Editor. *Everybody's Cookbook,* 2d Edition. New York: Harcourt, Brace and Company, 1937.

Lord, Isabel Ely. *The Household Cook Book,* 2d Edition. New York: Harcourt, Brace and Company, 1930.

INDEX OF RECIPES

GENERAL INDEX